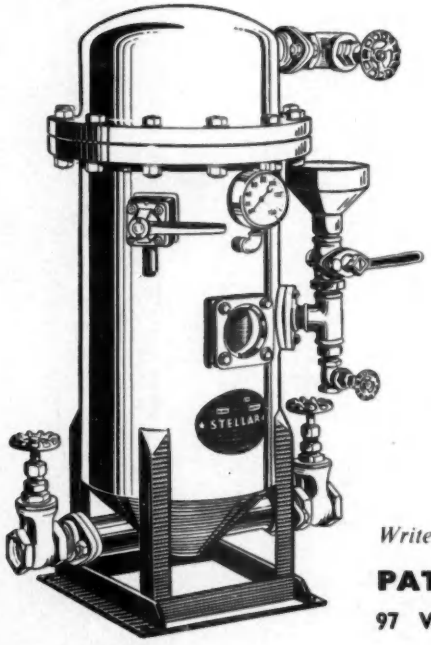
Chemical Age

ANTIBIOTICS AS FOOD ADDITIVES
(page 209)

VOL. 78 No. 1987

10 August 1957

STELLAR



★ Water of the highest physical purity
★ Plating solutions
★ Fine chemicals and pharmaceuticals
★ Waxes, oils, essences
★ Rolling oils in circulation
★ Photographic Chemicals
★ Synthetic Resin Solutions
★ Solvents, Varnishes

Write, with details of your filtration problems, to:—

PATERSON ENGINEERING CO. LTD.
97 Windsor House, Kingsway, London, W.C.2

FILTERS

WELLS OIL FILTERS

With a Wells' waste oil filter you can use your oil several times over and change it more often. A thoroughly reliable supply of oil is assured with the use of Wells' special filter pads which work in conjunction with Wells' patent syphon feed. The oil delivered from a Wells' filter can be used with complete confidence.

Write for fuller particulars of these filters

Delivery of Oil Filters and Special "Wells' Filter Pads from Stock"

Also makers of
OIL CABINETS, BARREL POURERS & PORTABLE PARAFFIN HEATER PLANTS, SPRAY GUNS & LIME SPRAYERS

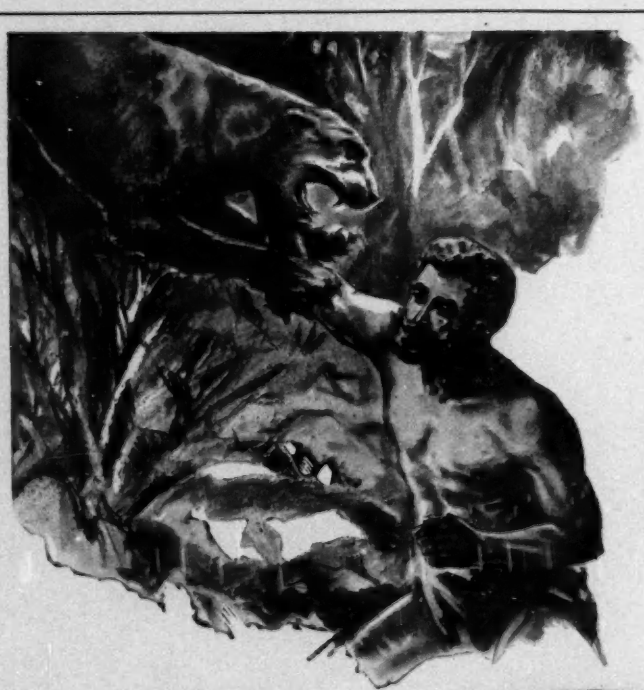
A. C. WELLS & CO.
LIMITED

HYDE • CHESHIRE
Tel: HYDE 953 *Grams:* UNBREAKABLE, HYDE

CROMIL & PIERCY LTD.

GRAPHITE IN ALL FORMS

MILBURN HOUSE
"E" FLOOR
NEWCASTLE-ON-TYNE
Tel.: 2-7761



the twelve labours

The fourth of the Herculean tasks—the killing of the lion that was terrorising the peasantry of Argolis, called for anticipation and resource rather than brute strength.

Hercules awaited the lion's attack and using a wrestlers' 'throw' put the beast on its back, promptly throttled it and removed its arrow- and spear-resisting skin.

Hercules thereafter always wore the skin which became a symbol of his strength and dependability.

DEPENDABILITY IS THE KEYNOTE IN **STAVELEY** CHEMICALS FOR INDUSTRY

THE STAVELEY IRON & CHEMICAL CO LTD near CHESTERFIELD

ACETONE

ISOPROPYL ALCOHOL

n-BUTANOL

Availability:

These high quality chemicals, manufactured at Billingham from propylene produced in the oil-cracking plant at Wilton, are available in road tank-wagons and drums. Stocks are maintained at convenient distribution centres for prompt delivery to all parts of the country.

For further information, consult:

IMPERIAL CHEMICAL INDUSTRIES LTD.

LONDON, S.W.1.

3149

INDEX TO ADVERTISERS

The first figures refer to advertisement in **Chemical Age Year Book**, *the second to the current issue*

Page		Page
229	A.P.V. Co., Ltd., The	—
344	Acalor (1948) Ltd.	—
209	Accrington Brick & Tile Co., Ltd., The	—
176	Adequate Weighers Ltd.	—
	Aero Research Ltd.	—
223	Aimer Products Ltd.	—
159	Albany Engineering Co. Ltd., The	—
	Alexander, Herbert, & Co., Ltd.	—
165	Allen, Edgar, & Co., Ltd.	—
364	Alumina Co., Ltd., The	—
328	Amalgamated Oxides (1939) Ltd.	—
306	Armour & Co., Ltd.	cov. iii
G/Cd.	Ashmore, Benson, Pease & Co.	—
189	Ashworth, Arthur, Ltd.	—
	Associated Lead Mfrs. Ltd.	—
G/Cd.	Audley Engineering Co., Ltd.	—
146	Autometric Pumps Ltd.	—
212	B. A. Holland Engineering Co., Ltd., The	—
282	Baker Perkins Ltd.	—
324	Baker Platinum Division, Engelhard Industries Ltd.	—
233	Balfour, Henry, & Co.	—
210	Barclay Kellett & Co., Ltd.	—
250	Bennett, Sons & Shears Ltd.	—
G/Cd.	Berk, F. W. & Co., Ltd.	—
242	Beryllium & Copper Alloys (Safety Tools) Ltd.	—
	Bivac Air Co. Ltd.	—
270	Black, B., & Son, Ltd.	—
2	Blackman Keith Ltd.	—
204	Blundell & Crompton Ltd.	—
148	Borax Consolidated Ltd.	—
	Borax & Chemicals Ltd.	—
289	Boulton, William, Ltd.	—
228	Bowmans Chemicals Ltd.	—
270	Braby, Fredk., & Co., Ltd.	—
183	Bramigk & Co., Ltd.	—
	British Acheson Electrodes Ltd	—
224	British Arca Regulators Ltd.	—
217	British Carbo Norit Union Ltd.	—
	British Ceca Co., Ltd., The	—
216	British Chrome & Chemicals Ltd. (London)	—
230	British Chrome & Chemicals Ltd. (Lancs)	—
	British Drug Houses Ltd., The	—
	British Geon Limited	—
8	British Industrial Solvents	—
236 & 237	British Laboratory Ware Association Ltd.	—
275	British LaBour Pump Co., Ltd.	—
240	British Lead Mills Ltd.	—
360	British Railway Traffic & Electric Co., Ltd.	—
Spine	British Resin Products Ltd.	—
172	British Rototherm Co., Ltd., The	—
227	British Steam Specialties Ltd.	—
168	British Tar Products Ltd.	—
	British Thomson-Houston Co. Ltd.	—
170	British Titan Products Co., Ltd.	—
397	Broadbent, Thomas, & Sons, Ltd.	—
231	Brotherhood, Peter, Ltd.	—
244	Brotherton & Co., Ltd.	—
	Brough, E. A., & Co., Ltd.	—
234	Browns Foundry Co., Ltd.	—
218	Brush Design Group, The	—
175	Bryan Donkin Co., Ltd., The	—
180	Buell (1952) Ltd.	—
272	Burnett & Rolfe Ltd.	—
	Buss Ltd.	—
	Butterworths Scientific Publications	—
201	Butterfield, W. P., Ltd.	—
160	Calder Vale Glassworks Ltd.	198
	Callow, F. E. (Engineers) Ltd.	—
	Callow Rock Lime Co. Ltd., The	—
354	Candy Filter Co., Ltd., The	—
	Cannon (G. A.) Ltd.	—
238	Carbon Dioxide Co., The	—
280	Carmichael, John R., Ltd.	—
243	Catalin Ltd.	—
	Chapman & Hall Ltd.	—
	Chemical Construction (Great Britain) Ltd.	—
191	Chemical Workers' Union, The	—
	Chemicals & Feeds Ltd.	—
318	Chemitrade Ltd.	—
284	Chesterfield Tube Co., Ltd., The	—
203	Ciech (Poland)	—
264	Cinema Television Ltd.	—
224	Clark, T. & C., & Co., Ltd.	—
	Classified Advertisements	226, 227, 228
258	Clayton Dyestuffs Co. Ltd., The	—
199	Clayton, Son & Co., Ltd.	—
288	Clydesdale Chemical Co. Ltd.	204
285	Clyde Tube Forgings Ltd.	—
213	Cole, R. H., & Co., Ltd.	—
208	Cole & Wilson Ltd.	—
204	Collins Improved Firebars Ltd.	—
	Colt Ventilation Ltd.	—
	Colvin-Smith Ltd.	—
348	Comet Pump & Eng. Co. Ltd., The	—
	Constable & Co.	—
	Controlled Convection Drying Co.	—
	Costain-John Brown Ltd.	—
4	Crofts (Engineers) Ltd.	—
	Cromil & Piercy Ltd.	cov. ii
171	Cruickshank, R., Ltd.	—
334	Curran, Edward, Engineering Ltd.	—
304	Cyanamid Products Ltd.	—
222	Cyclops Engineering Co. Ltd., The	—
288	Cygnet Joinery Ltd.	—
286	Danks of Netherton Ltd.	—
216	Davey, Paxman & Co., Ltd.	—
	Dawson, McDonald & Dawson Ltd.	228
170	Derby Luminescents Ltd.	—
161	Dorr-Oliver Co., Ltd.	—
280	Douglas, William, & Sons Ltd.	—
200	Dowlow Lime & Stone Co., Ltd., The	—
	Dring & Fage Ltd.	—
174	Drummond Patents Ltd.	—
195	Dryden, T., Ltd.	—
	Dunlop Rubber Co., Ltd.	—
	Dutt, P. K., & Co., Ltd.	—
232	E.D.C., Ltd.	—
330	Edison Swan Electric Co., Ltd., The	—
	Electric Resistance Furnace Co. Ltd.	—
268	Electronic Switchgear (London) Ltd.	—
244	Electrothermal Engineering Ltd.	—
B/Mk.	Elliott, H. J., Ltd.	—
	Emcer Products	—
	Enamelled Metal Products Ltd.	—
166	English Glass Co., Ltd., The	—
G/Cd.	Erinoid Ltd.	—
207	Evered & Co., Ltd.	—
	Fairey Aviation	203
280	Farnell Carbons Ltd.	—
	Fawcett Finney Ltd.	—
202	Ferris, J. & E., Ltd.	—
	Fleischmann (London) Ltd.	—
220	Film Cooling Towers (1925) Ltd.	—
253	Foxboro-Yoxall Ltd.	—
	Fraser, W. J., & Co., Ltd.	—
298	Fuller's Earth Union Ltd., The	—
188	Gallenkamp, A., & Co., Ltd.	—
	Gas Council, The	—
266	Geigy Pharmaceutical Co., Ltd.	—
	General Electric Co., Ltd.	—
	Glebe Mines Limited	—
	Goodyear (Export Div.)	—
290	Graviner Mfg. Co., Ltd.	—
265	Grazebrook, M. & W., Ltd.	—
164	Greeff, R. W., & Co., Ltd.	—
192	Grindley & Co., Ltd.	—
232	Hackbridge & Hewittic Electric Co., Ltd.	—
202	Haller & Phillips Ltd.	—
214	Hanovia Lamps	—
	Hanson Books	—
206	Harris (Lostock Gralam) Ltd.	—
222	Haworth, F. (A.R.C.) Ltd.	—
158	Hearson, Charles, & Co., Ltd.	—
238	Herbert, Alfred, Ltd.	—
	Hickson & Welch Ltd.	202
193	Holroyd, John, & Co., Ltd.	—
234	Honeywill & Stein Ltd.	—
248	Hopkin & Williams Ltd.	—
187	Humphreys & Glasgow Ltd.	—
310	Huntington, Heberlein & Co. Ltd.	—
310	I.C.I. Billingham Organic	197
	I.C.I. General Chemicals Solvents	201
	I.C.I. Plastics—Darvic	—
	I.C.I. Plastics—Fluon.	—
	I.C.I. Ltd., (Plastics Div.) Corvic	—
	Imperial Chemical Industries Ltd.	—

continued on page 20

KEEBUSH

Keebush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids; is unaffected by temperatures up to 130°C; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—

KESTNER'S

5 Grosvenor Gardens, London, S.W.1

CALDER VALE GLASSWORKS LTD

Calder Vale Rd. • Wakefield • Yorks

TEL. WAKEFIELD 3857

● *SPECIALISTS IN* ●

Carboys • Demijohns Winchesters

ETHANOLAMINES

POLYETHYLENE GLYCOLS

used in the manufacture and formulation of a wide range of important products, including

dyes
morpholine
non-ionic detergents
spinning lubricants
foam stabilizers
shampoos
accelerators
synthetic lubricants
hydraulic fluids

The materials can also be used as humectants, plasticisers and mould release agents

Full information and samples on request to:

OXIRANE LIMITED

A wholly-owned subsidiary of Petrochemicals Limited

SOUTHERN DIVISIONAL SALES OFFICE
NORMAN HOUSE, 105/9 STRAND, W.C.2.
Telephone: TEMple Bar 4455

NORTHERN DIVISIONAL SALES OFFICE
144/146 DEANSGATE, MANCHESTER 3
Telephone: Blackfriars 4852

170 Piccadilly, London, W.1.
Telephone: MAYfair 6618

INDEX TO ADVERTISERS

The first figures refer to advertisement in **Chemical Age Year Book**, *the second to the current issue*

Page		Page
157	Imperial Smelting Corporation (Sales) Ltd.	—
	Industrial & Marine Protective Applications Limited	—
	International Combustion Group	—
	Isopad Ltd.	—
246	Jackson, Henry (Liverpool) Ltd.	—
214	Jackson, J. G., & Crockatt Ltd.	—
245	Jenkins, Robert, & Co., Ltd.	—
249	Jenkinson, W. G., Ltd.	—
3	Jobling, James A., & Co., Ltd.	—
	Johnson, S. H., & Co., Ltd.	—
166	Johnsons of Hendon Ltd.	—
267	Jones, Tate & Co., Ltd.	—
228	K.D.G. Instruments Ltd.	—
178	K. W. Chemicals Ltd.	—
	Kaylene (Chemicals) Ltd.	—
278	Kernick & Son Ltd.	—
395	Kestner Evaporator & Engineering Co., Ltd.	—
395	Kestner Evaporator & Engineering Co., Ltd. (*Keebush*)	198
	Kestner (Industrial Safety) Ltd.	—
	Key Engineering Co., Ltd., The	—
283	Kier, J. L., & Co., Ltd.	—
271	Kleen-e-ze Brush Co., Ltd.	—
206	Lankro Chemicals Ltd.	—
210	Laporte Chemicals Ltd.	—
184	Lavino (London) Ltd.	—
252	Leda Chemicals Ltd.	—
264	Leek Chemicals Ltd.	—
162	Leigh & Sons Metal Works Ltd.	—
	Lennig, Charles, & Co. (Great Britain) Ltd.	—
	Lennox Foundry Co., Ltd.	203
219	Light, L., & Co., Ltd.	—
274	Lind, Peter, & Co., Ltd.	—
Cover	London Aluminium Co. Ltd., The	—
	Longman Green & Co., Ltd.	—
278	Lord, John L., & Son	cov. iv
190	Machinery (Continental) Ltd.	—
257	Mallinson & Eckersley Ltd.	—
	Manesty Machines	—
342	Marchon Products Ltd.	—
226	Marco Conveyor & Eng. Co. Ltd.	—
168	Matthews & Yates Ltd.	—
	May & Baker Ltd.	—
173	Measuring & Scientific Equipment Ltd.	—
	Meigh Castings Ltd.	—
Cover	Metal Containers Ltd.	—
	Metalfiltration Co., Ltd.	—
G/Cd.	Metalock (Britain) Ltd.	—
174	Metcalf & Co.	—
	Metropolitan-Vickers Electrical Co., Ltd.	cov. iv
178	Middleton & Co., Ltd.	—
	Mills Packard Construction Co., Ltd.	—
215	Mine Safety Appliances Co. Ltd.	—
	Mirrlees Watson Co. Ltd., The	—
180	Mirvale Chemical Co., Ltd.	—
254	Mitchell Cotts & Co., Ltd.	—
	Mond Nickel Co., Ltd., The	—
	Monsanto Chemicals Ltd.	—
	Morgan Crucible Co., Ltd., The	—
200	Moritz Chemical Engineering Co., Ltd.	—
181	Neckar Water Softener Co. Ltd.	—
268	Nederlandse Emballage Ondeernemming Gebr. de Wilde N.V.	—
221	Negretti & Zambra Ltd.	—
	New Metals & Chemicals Ltd.	—
	Newnes, George Co., Ltd.	—
276 & 277	Newton Chambers & Co. Ltd.	—
239	Nicolson, W. B. (Scientific Instruments) Ltd.	—
177	Nordac Ltd.	—
211	North Thames Gas Board	—
194	Northern Malleable Foundry Co., Ltd., The	—
179	Northey Rotary Compressors Ltd.	—
	Nu-Swift Ltd.	—
296	Palfrey, William, Ltd.	—
	Paper Good Manufacturing Co., Ltd.	—
	Pascall Engineering Co. Ltd., The	—
6	Paterson Engineering Co. Ltd., The	Front cov.
287	Peabody Ltd.	—
	Penrhyn Quarries Ltd.	—
	Pergamon Press	—
320 & 368	Permutit Co., Ltd., The	225
G/Cd.	Petrocarbon Developments Ltd.	—
	Petrochemicals Ltd.	199
340	Pool, J. F., Ltd.	—
	Pott, Cassels & Williamson	204
358	Powell Duffryn Carbon Products Ltd.	—
G/Cd.	Power-Gas Corporation, Ltd., The	—
169	Price Stutfield & Co., Ltd.	—
	Prodorite Ltd.	—
242	Production Chemicals (Rochdale) Ltd.	—
261	Pye, W. G., & Co., Ltd.	—
	Pyrethrum Board of Kenya	—
	Q.V.F. Ltd.	—
314	Reads Ltd.	—
	Richmond Welding Co., Ltd.	—
	Robinson, F., & Co., Ltd.	—
G/Cd.	Rose, Downs & Thompson Ltd.	—
230	Rotometer Manufacturing Co. Ltd.	—
167	St. Helens Cable & Rubber Co. Ltd.	—
269	Sandiacre Screw Co. Ltd., The	—
182	Scientific Glass-Blowing Co., The	—
285	Shaw Petrie Ltd.	—
255	Sheepbridge Alloy Castings Ltd.	—
356	Shell Chemical Co., Ltd.	—
256	Siebe, Gorman & Co., Ltd.	202
350	Sigmund Pumps Ltd.	—
	Simon, Richard, & Sons, Ltd.	—
344	Southern Instruments Computer Division	—
338	Spencer Chapman & Messel Ltd.	—
	Stabilag Co., Ltd., The	228
396	Stanton Instruments Ltd.	—
	Staveley Iron & Chemical Co. Ltd.	cov. ii
212	Steel, J. M., & Co., Ltd.	—
	Stockdale Engineering Co., Ltd.	—
	Stonehouse Paper & Bag Mills	—
	Streamline Filters Ltd.	—
	Sturge, John & E., Ltd.	—
251	Sutcliffe Speakman & Co., Ltd.	—
279	Taylor Rustless Fittings Co., Ltd.	—
235	Tenaplas Sales Ltd.	—
218	Thermal Syndicate Ltd., The	—
196	Thomas & Bishop Ltd.	—
	Thomason, W., & Sons Ltd.	—
145	Thompson, John (Dudley) Ltd.	—
	Todd Bros. (St. Helens & Widnes) Ltd.	—
198	Towers, J. W., & Co., Ltd.	—
197	Trent Valve Co., Ltd.	—
160	Tungstone Products Ltd.	—
259	Unifloc Ltd.	—
	Unilever Ltd.	—
	United Coke & Chemicals Co. Ltd.	—
247	United Filters & Engineering Ltd.	—
	United Kingdom Atomic Energy Authority	—
	Vaughan Crane Co., Ltd.	—
192	W.E.X. Traders Ltd.	—
241	Walker Extract & Chemical Co. Ltd.	—
	Wallach Bros. Ltd.	—
263	Waller, George & Son Ltd.	—
161	Walley, A. L.	—
162	Wallis, Charles, & Sons (Sacks) Ltd.	—
	Ward, Thos. W., Ltd.	—
185	Watson, Laidlaw & Co., Ltd.	—
260	Wells, A. C., & Co., Ltd.	cov. ii
182	Wengers Ltd.	—
217	Whessoe Ltd.	—
	Whiffen & Sons Ltd.	—
196	Whitaker, B., & Sons Ltd.	—
163	Widnes Foundry & Engineering Co., Ltd.	—
	Wilkinson, James, & Son, Ltd.	—
186	Wilkinson Rubber Linatex Ltd.	—
273	Willcox, W. H., & Co., Ltd.	—
194	Williams, & James (Eng.) Ltd.	—
172	Wilson, Edward, & Son Ltd.	—
268	Wilde, Gebr. De Nederlandse Emballage Ondernemming N.V.	—
220	Wood, Harold, & Sons Ltd.	200
184	Worcester Royal Porcelain Co., Ltd., The	228
	Worthington-Simpson Ltd.	—
281	Wynn (Valves) Ltd.	—
225	Yorkshire Tar Distillers Ltd.	—
226	Zeal, G. H., Ltd.	228

SPECIALISTS IN

BULK LIQUIDS

TRANSPORT

ACIDS · OILS · SPIRITS
AND GENERAL CHEMICALS

HAROLD WOOD & SONS LTD.
Wormald St. · Heckmondwike
Tel.: Heckmondwike 1011/5 Telegraph: 'Transport' Heckmondwike
Temporary London Area Office: Foundry Cottage, Orsett, Grays.
Tel.: Orsett 473

JAMES D. BIRCHALL

The Classification of Fire Hazards and Extinction Methods

Second printing 8s. (*post paid*)

Ernest Benn · Fleet Street · London

CHLOROFORM

PERCHLOROETHYLENE

METHYLENE CHLORIDE

TRICHLOROETHYLENE

If you have a solvent problem,
one of the I.C.I. chlorinated hydrocarbons
may provide the solution

Non-inflammable Chlorinated Hydrocarbons

Solvents with a wide range of application, including metal degreasing, dry cleaning, paint removal, and the extraction of oils, fats, waxes, pharmaceuticals and other fine chemicals.

ICI

Available from
IMPERIAL CHEMICAL INDUSTRIES LTD.
LONDON, S.W.1

CC.10

GARDINOLS *for finishing*

Hickson & Welch Ltd. *castleford*

SAFER with... Siebe Gorman

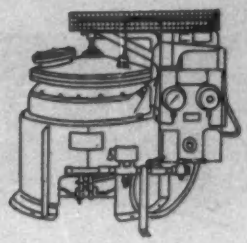
IN GASEOUS ATMOSPHERES, in Chemical, Gas and Refrigerating Plant, Siebe, Gorman equipment safeguards life and health. It covers all routine and emergency requirements, involving repairs, inspection and rescue.
Here are some typical applications:
SELF-CONTAINED BREATHING APPARATUS. Compressed air and oxygen types with durations from ½ hour to 2 hours.
RESPIRATORS of the filter type. "Puretha" Mark IV and "Gaspro" Gas Respirators. Also dust and fume masks.
SMOKE AND GAS HELMETS AND MASKS of the fresh air type. "Spirelmo", "Bloman", "Antipoys", etc.
RESUSCITATION APPARATUS. Oxygen types for asphyxia, electric shock, etc., including "Novox" and "Novita".
GAS DETECTION APPARATUS and Protective Clothing of all types.

Established 1819

SIEBE GORMAN & CO. LTD.
EQUIPMENT FOR SAFETY AND RESCUE

Neptune Works, Davis Rd., Chessington, Surrey
Telegrams: Siebe, Chessington *Telephone: Elmbridge 5900*

SG(C)2



steam or oil jacketed

AUTOCLAVES

The Lennox Foundry Company are specialists in the supply of materials of construction for resisting corrosion and in the manufacture of process plant for specialised applications. In most cases we can supply plant designed for particular working conditions, constructed of the most suitable materials for these requirements, and, if necessary, we can build pilot plant for developing new processes. Our technical staff are always at your service to give advice.

IN TANTIRON AND HOMOGENEOUSLY LEAD LINED STEEL

by Lennox

LENNOX FOUNDRY CO. LTD.
Tantiron Foundry, Glenville Grove, London, S.E.8

FAIREY

4 range safety ohmmeter

with Certificate of Intrinsic Safety

This Fairey-developed instrument embodies a new approach to the problem of testing electrical explosive circuits with assured safety.

This is achieved through the use of a selenium barrier-layer photo-electric cell in conjunction with the Wheatstone bridge circuit : the output under any condition cannot exceed a short circuit current of 10 mA or open-circuit voltage of 0.7 V. The one instrument covers four ranges by simple switching, being capable of measurements formerly requiring four separate ohmmeters.

The Fairey Safety Ohmmeter is Recommended by the Ordnance Board and Approved by the Ministry of Supply for the British Army and the Royal Air Force.

Ranges: 0-10 ohms 0-100 ohms 0-1 Kohm 0-10 Kohms

For brochure write to Dept. 5

THE FAIREY AVIATION COMPANY LIMITED · Weapon Division · HESTON · MIDDX.
ENGLAND · AUSTRALIA CANADA

ACTIBON

. . . the highly activated Carbon for ALL Decolourising purposes

THE CLYDESDALE CHEMICAL CO. LTD.

142 QUEEN STREET · GLASGOW C.1

Phone: CENtral 5247/8
Grams: "Cactus" Glasgow

48 x 24

ELECTRICALLY DRIVEN

CENTRIFUGAL

★ Cast iron framing.
★ Copper perforated and hooped basket with bronze centre.
★ Copper sheathed spindle and copper safety cover.
★ Mechanical plough with counter balance weight.
★ Scoop controlled fluid coupling.
★ Totally enclosed electric motor.

POTT, CASSELS & WILLIAMSON
MOTHERWELL, SCOTLAND

VOL. 78 No. 1987
10 AUGUST 1957

CHEMICAL AGE

Telephone: FLEet Street 3212 (26 lines)
Telegrams: Allangas · Fleet · London

Editor M. C. HYDE
Manager H. A. WILLMOTT
Director N. B. LIVINGSTONE WALLACE

Midlands Office
Daimler House, Paradise Street, Birmingham. [Midland 0784-5]

Leeds Office
Martins Bank Chambers, Park Row, Leeds 1. [Leeds 22601]

Scottish Office
116 Hope Street, Glasgow, C2. [Central 3954-5]

IN THIS ISSUE

Radioisotope Prosperity	206
Monsanto form New Divisions	207
Ion Retardation	207
Wiggins Teape New Research Labs.	208
British Association—Chemistry Papers	208
Antibiotics as Food Additives	209
Distillates	212
Paris Congress Concluded	213
High Temperature Chemistry	213
New Ceramic Engineering Material	214
Overseas News	215
Equipment Review	217
Peter Spence—Chemical Pioneer	219
2nd Quarter's Sulphuric Acid Returns	220
People in the News	221
Commercial News	222
Trade Notes	223
Patents	224

Annual subscription is 52s 6d ($7.40), single copies 1s 3d (by post 1s 6d).

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

FUNDAMENTAL RESEARCH

REPORTS from the US have suggested that many chemical concerns, having carried out some essential fundamental research over the past five years, are now stressing applied research in their research departments. It may therefore be for this reason that the Mellon Institute of the US in its annual report for 1956–1957 stresses that the most significant action taken this year by its Board of Trustees has been the decision to cultivate extensive fundamental research within the framework of the Institute's organisation.

Extensive studies have shown that this policy, which is to be followed without restricting the Institute's basic ideas regarding long-range applied science research, especially pioneering programmes, to be in the best interests of the profession, the Government, the industries, and the public.

It is believed that in the UK many suitably equipped chemical concerns are tending more and more to leave fundamental research to the universities. Many companies, it is true, advance large sums of money in special fellowships and grants to universities for this type of research but these are never enough. Today, expensive equipment and apparatus are required in fundamental research. True, few companies would refuse access to some special piece of equipment for research purposes, but so often it means that the research worker has to wait for a suitable opportunity when the equipment is not required for the company's own purposes, for which it was purchased in the first place. Long distances may have to be travelled to reach the necessary equipment, thus causing additional delays in completing research work. Freedom to function creatively is essential in fundamental research.

Besides the motivation and creative ability of the scientists desirous of carrying on fundamental research, environment plays a significant part, particularly for the young scientist. Teamwork stimulates creativeness and invigorates performance. A difficult problem so often requires approaches from many angles, with contributions by several different types of scientists, methods and materials.

Suitable institutes can build up the facilities necessary for obtaining fundamental knowledge. From the initiation of the problem, ideas follow and research can be planned. The professional resources of many scientific fields are accessible.

Fundamental research is necessary in pioneering applied research, for it provides new knowledge through discovery. But most valuable is applied and fundamental research being carried out side by side where mutual or joint interests can be co-ordinated. Information and ideas can thereby be exchanged. So often in the UK ideas and information are available to industrial research investigation but not to the university man or vice-versa.

University authorities thrive on their research investigations just as much as the industrial concern, but the question of finance is always before them. It is certain that fundamental research of great value is hindered or not started because those interested are forced to seek industrial appointments for financial reasons. New scientific discoveries require comprehensive fundamental research together with long-term applied research. Research at universities must be safeguarded, the chemical industry should lift many of the barriers it has imposed regarding its own research investigations, and research institutions in the country should not lack for anything.

RADIOISOTOPE PROSPERITY

RECENTLY the value of radioisotopes in the chemical industry and as an export material was reviewed (CHEMICAL AGE, 22 June, p. 1039). Further details have now been given of uses of radioisotopes in the third annual report of the UK Atomic Energy Authority and from the US Atomic Energy Commission's semi-annual report, presented at the end of last month.

From the UK AEA report, it is encouraging to note that sales of radioisotopes have continued to increase. Sales are valued at about £541,000 (£154,000 from the Isotope Division at Harwell and £387,000 from the Radiochemical Centre at Amersham) for the year ended 31 March last and show an increase of 12 per cent over the preceding year. Of the total sales, 56 per cent was exported. Sales of nuclear materials (other than radioisotopes) and technological information to overseas countries brought the Authority a revenue of £545,954 during the year under review. From the US report it is learned that radioisotopes are contributing to the economy of that country by an annual saving of nearly $400 million (about £140 million) in industrial uses alone, and the field to use isotopes is constantly being broadened. Elsewhere in this issue will be found details of a first US shipment of radioactive isotopes to the USSR (see p. 215). Exports from Britain went to 52 countries, Canada, France, Germany, Japan, the US and Sweden being among the principal buyers.

Other items of commercial significance noted in the UK AEA report were that the quantity of radioisotopes produced by irradiation in nuclear reactors will be substantially increased when the new reactors DIDO and PLUTO are brought into use for isotope production. Caesium-137 is being separated in an experimental plant at Windscale and several large sources of this interesting material have been produced. Strontium-90, also of considerable interest, has been produced as well. Present production capacity of these isotopes in no way fulfills the demand for these. The Authority are therefore considering the design and construction of a plant to separate very much larger quantities of caesium-137 and strontium-90. Demand for other minor isotopes also exceeds supply, it is learned.

As experience is gained in the use of radioisotopes and the possibilities associated with irradiation, there has been a growing increase in special irradiations carried out in BEPO. Training centres have also required more antimony—beryllium neutron sources. Cobalt-60 for industrial and medical uses has been sent in quantities of 100–500 curies to 14 countries, including Japan and Australia.

Noteworthy is that Wantage Radiation Laboratory has been occupied in part by the Technological Irradiation Group. Two large shields have been constructed which will contain 10,000 and 4,500 curie sources of cobalt-60 respectively. Another eight smaller shields will contain 2,000 curies each and a 4 Me V linear acceleration has been installed. Eight companies, it is gratifying to note, have seconded staff to work at the laboratory.

New applications for specific radioisotopes continue to be evolved. Tellurium-132 can now be supplied as telluric acid solution by which iodine-132 (a short-lived iodine isotope), much used in clinical investigation, can be obtained over a period of at least a week from the date of dispatch by a simple distillation procedure.

A cheaper method that is at least as sensitive as more orthodox methods, has been developed for continuously determining sulphur and lead contaminants in liquid hydrocarbons in oil processing. Standard preparations of radioactive tritium on zirconium foils are used. Beta particles emitted by tritium are slowed down by zirconium atoms and the absorption of bremsstrahlung (braking radiation) gives an indication of the amount of contamination.

Other industrial applications include a self-adjusting gauge (using a thulium-170 source) to indicate continuously the liquid level in enclosed pipes. A 50 per cent increase in demand has occurred for labelled compounds and undoubtedly reflects the increasing value of these materials as research tools. Specific activity and chemical purity have been improved to the limits imposed by decomposition of the materials.

A small but important demand is for stable isotopes, separated from the elements in which they occur naturally, as targets for nuclear physics experiments with particle accelerations. Specialised fields such as isotopic dilution analysis, optical spectroscopy and superconductivity also require samples of isotopes.

Techniques of chemical analysis by neutron activation have been developed which are stated to have led to interesting results in pure as well as applied chemistry. The method is extremely sensitive. It has been used, for instance, to determine an impurity present in a semiconductor in concentrations as low as one part in 10,000 million (copper in silicon). Similarly the minute traces of gold in sea water have been determined.

When radiation chemistry was considered by CHEMICAL AGE (reference above), it was remarked that industry was not taking enough advantage of the value of radioisotopes and techniques associated with irradiation. This UK AEA report also refers to the few negotiations of access agreements although there has been a steady flow of enquiries from industry as a whole recently. It is suggested that this is due to companies being unaware of the large amount of published information already available. It is to be hoped that more concerns will study the bibliographies of the published information from which they will undoubtedly gain a great deal that is of value to them.

DYE FOR MILK REQUIRED

AT the recent conference on the control of food additives reference was made by all the lecturers, in the session devoted to chemical additives with particular reference to antibiotics, to the treatment of mastitis in cows with penicillin and the effects noted in market milk containing this antibiotic. It was noted very early in penicillin's therapeutic history that milk from cows treated with penicillin inhibited cheese-making. Since then the problem of penicillin in milk for the normal home market has attracted the attention of US public health officials, mainly because of the possible risk that milk of this kind could be consumed by those people who are allergic to penicillin. In the US a warning that the milk obtained during the first 72 hours after antibiotic treatment must be discarded is required to be printed on the labels of US penicillin preparations for cow mastitis. Another requirement is that no package of such a preparation shall contain more than 100,000 units of penicillin; formerly some preparations contained as much as one million units.

It is now learned that the Food and Drug Administration is trying to find a dye that can be added to penicillin preparations to be used for treatment of cow mastitis and will impart a characteristic colour to the milk for the 72-hour period following treatment. This would ensure that the coloured milk would not be mixed with other milk sent to the domestic market.

So far a suitable dye has not been found, for the dye must not only remain effective for over 72 hours but it must also be non-toxic to the cow. A modified sulphonamide compound imparts a red colour to milk but is only effective for 30 hours. A suitable dye is therefore still awaited from dye chemists.

MONSANTO FORM NEW DIVISIONS FOR CHEMICALS AND PLASTICS

TO MEET the requirements of the continued growth of business and their current programme of expansion, Monsanto Chemicals Ltd. are developing their internal organisation.

Operations are now divided between two new divisions, the chemicals division and plastics division. Monsanto say that this decentralisation will increase the efficiency of customer and after-sales service and enable more attention to be given to production, research and technical matters.

Mr. D. R. Mackie has been appointed director of the chemicals division in addition to his duties as managing director. Dr. J. W. Barrett has been appointed director of the plastics division in addition to his duties as technical director.

Mr. Mackie

Dr. Barrett

The directors of the chemicals and plastics divisions will carry overall responsibility for all operations in their respective divisions, including the co-ordination of production and engineering, sales, research and personnel. The main products handled by the chemicals division will be heavy and fine chemicals. The main products handled by the plastics division will be plastics, rubber chemicals, oil additives and other technical chemicals.

The following additional realignments of functions and responsibilities have taken effect:—

Mr. N. F. Patterson, previously operations director, now becomes director of production and engineering with additional overall responsibility for purchasing department, and, through Mr. S. E. Chaloner, labour relations.

Dr. W. H. Garrett becomes personnel director responsible for industrial relations and general personnel policy.

Mr. W. Morgan Thompson, sales director, has resigned from the company on taking up another appointment.

Mr. D. C. M. Salt has been appointed general manager of sales of the chemicals division and Mr. J. S. Hunter has been appointed general manager of sales of the plastics division.

On the retirement of Mr. F. S. Mortimer, manager of the industrial and public relations department, Mr. A. R. Crew, manager of the advertising department, has now taken over responsibility for public relations also.

The wholly-owned subsidiary, Monsanto Plastics Limited, will cease to function in view of the change to divisional organisation. Sales of styrene plastics are now the responsibility of the plastics division. Mr. G. V. Cox has been appointed manager, plastics sales department, and will be responsible to Mr. Hunter. Mr. E. L. Pixton has left the company.

Ion Retardation With New Type of Resin

DEVELOPMENT of a new and unique process in the ion exchange field for separating water soluble materials has been announced by the Dow Chemical Co., US. Known as 'ion retardation' this development, which makes use of a new type of ion exchange resin, is stated to be a significant extension of the ion exchange principle.

The new type of resin has the unusual characteristic that both anionic and cationic exchange sites are located in the same bead. The result is that the resin will adsorb both anions and cations from feed solutions. However, these resin sites are so closely associated that they partially neutralise the electrical charges in each other; the adsorbed ions are thus weakly held and may be displaced from the resin by the use of water as a regenerant.

The name 'ion retardation' is derived from the fact that in this process the flow of ions through the column is retarded because of the ion adsorbing properties of the resin.

In practice, the resin is made by polymerising an anionic monomer inside the pores of an anion exchange resin, or a cationic monomer inside a cation exchange resin. The resulting linear polymer is trapped inside the cross-linked ion exchange resin and cannot diffuse out. The mixing of cation and anion exchangers in the resin system takes place at the molecular level.

Dow Chemical have prepared their new general utility resin by polymerising acrylic acid inside their Dowex 1 resin. This retardation resin will be sold under Dow's trademark, Retardion 11A8.

Ion retardation is a column operation, performed by alternating portions of feed solution and rinse water. It offers an economical process for purifying such salts in solutions; as in ion exclusion, water is the only chemical required for operating the process. Of particular interest is its ability to separate two electrolytes such as ferrous sulphate from zinc sulphate, sodium hydroxide from sodium chloride and ammonium chloride from zinc chloride.

Another important feature is the ability of ion retardation to separate an electrolyte from a non-electrolyte. In this respect ion retardation is similar to ion exclusion with the exception that it has the added advantage of being able to separate salts from very large non-electrolytic molecules. This separation is possible since the operation of the process only requires that the salt penetrate the resin matrix.

Its chief difference from ion exchange is the use of water in place of chemicals for resin regeneration. Ion retardation may profitably be used in place of ion exchange in processes where high concentrations of ions are involved. It can be used, it is claimed, to separate and remove the bulk of the ionic materials, while ion exchange can be used if desired as a final 'polishing operation'.

Use of ion retardation is of special interest where processes are now utilising dialysis, fractional crystallisation or ion exchange. Its major use will be, it is considered, in deionisation of mixtures of ionic and non-ionic materials where the ionic concentrations are too high for economical processing by ion exchange, or where the non-ionic materials are sensitive to the acidity or basicity of ion exchange resins. Also, it offers unusual promise in the fractionation of ionic mixtures where the cost of eluant or regenerant chemicals makes ion exchange prohibitively expensive.

Nuclear Patent Settlement

PHILIPS ELECTRICAL LTD. and the UK Atomic Energy Authority have reached a settlement in their action arising from Professor Fermi's nuclear energy patent (BP 465,045).

The patent is based on an invention made by Professor Fermi working in Rome in 1934, who discovered that neutrons which have been slowed down by collisions with light atoms are more effective than fast neutrons for producing radioactive elements. Full rights for most countries, other than the US, were subsequently obtained by Philips.

In March 1956, after several years' discussion, the patentees caused a writ to be served on the UKAEA alleging infringement of the patent. One month later Philips also applied for extension of terms of the patent.

Under a compromise now arrived at, the petition for extension is withdrawn and an undertaking made by Philips to secure that no claims will be made for the infringement of any corresponding patents abroad owned or controlled by any associated company of Philips. In return the authority is paying a sum (said by *The Financial Times* to be £10,000) to Philips. It is understood that in effect Philips have made over their patent rights to the authority.

Refurbishing at Heriot-Watt

Our reference to the refurbishing programme being undertaken at the Heriot-Watt College, Edinburgh, in CHEMICAL AGE, 20 July, p. 95, stated that the estimated cost was £150,000. This should have read £15,000, which is required for modernising the laboratories of the brewing and applied biochemistry department.

New Research HQ Opened for Wiggins Teape

BUTLER'S COURT, an historic Beaconsfield house built prior to 1704, acquired last year by the Wiggins Teape group, has after a year of intensive rehabilitation and conversion become the headquarters of the company's group research organisation. Its recent opening by Sir Miles Thomas, chairman of Monsanto Chemicals Ltd., was reported in CHEMICAL AGE, 27 July, p. 140.

These new headquarters are the culmination of a steady growth of research by Wiggins Teape, who set up the first research laboratories in the paper industry under the leadership of one of the pioneer scientists in this field, the late Stephen R. H. Edge, just after the first world war. This was first located at Glory Hill, Bucks, and when moved in 1934 to Stoneywood Works, Aberdeenshire, a separate research unit was set up under Dr. H. F. Rance to deal exclusively with problems relating to photographic base. The Wiggins Teape Group Research Organisation was born in 1948 when a new research unit was set up at Stoneywood.

The widespread demands for technical service for the mills and for the sales departments for research and development on new products led to a rapid growth of research activities.

'Base' for 'Field Operations'

The recognised need for more scientific control of a traditional industry led to some significant trends away from purely laboratory work into operational and process investigations by engineers, physicists, chemists and mathematicians in the mills and factories themselves. The group research laboratories became more of a 'base' for 'field operations' and another base sited more centrally for the mills in the south of England became necessary.

Dr. Rance, who now has his office at Butler's Court, is director in charge of research and group research and development. Mr. C. R. G. Maynard is group research manager at Butler's Court.

After the opening ceremony, the many visitors present were able to tour the laboratories. Prominent among the new facilities seen were the workshops where new research instruments are designed and produced and new control instruments evolved for the progressive automation of paper-making processes and machines.

Among the modern equipment installed at Butler's Court is the Unicam spectrophotometer used in the analysis of coloured solutions, of small differences in colour of papers or changes in colour due to fading or chemical treatment. One particular use is the checking of the colour of tiles used as substandards for the colorimeters in mills throughout the group.

Visitors saw the Schopper-Riegler wetness measurement apparatus which measures the drainage of a sample of pulp or stock to give an indication of the degree of mechanical treatment to which the fibres have been subjected.

The micro-Kjeldahl nitrogen determination apparatus was shown to be important for the control of application of nitrogenous material to paper, e.g. gelatin in tub-sized paper, wet strength resins, etc.

The 'wet-end' laboratory simulates on a small scale the principal functions of papermaking. The apparatus and techniques are of standard design so that experiments are reproducible.

In other sections visitors saw determination of moisture vapour permeability, analysis of paper samples, soxhlet extraction, oil resistance of glassine, measurement of air in stock by pipettes, etc.

An interesting feature of the constant humidity room was the thermal insulation of walls and ceiling with glass wool, covered with fibre board and painted with non-porous paint. The window is double-glazed and the air space between filled with dry air to prevent misting. A blind prevents entry of direct sunlight.

Sir Miles Thomas, who opened the laboratories, with Dr. H. F. Rance, director of research and development with Wiggins Teape Group

Chemistry Papers to be presented at BA Dublin Meeting

ANNUAL meeting of the British Association for the Advancement of Science will be held in Dublin on 4 to 11 September. It will be divided into 14 sections: mathematics and physics, chemistry, geology, zoology, geography, economics, engineering, anthropology and archaeology, physiology and biochemistry, psychology, botany, education, agriculture, and the assembly of corresponding societies.

President for 1957 is Professor P. M. S. Blackett, professor of physics, Imperial College, London, who will take as the subject for his presidential address, 'Technology and world advancement'.

Papers to be presented in the chemistry section will be divided into three groups. The first group will be on the biogenesis of natural products and will include 'Biogenesis or structural relations: the organic chemist's contribution' by Sir Robert Robinson, director, Shell Chemical Co., 'Acetic acid as a building unit in the formation of mould products' by Professor A. J. Birch, Manchester University, 'Biogenesis of flavonoids' by Professor T. S. Wheeler, University College, Dublin, 'Biogenesis of natural products' by Professor T. R. Seshadri, Delhi University, and 'The biogenesis of sterols' by Dr. G. J. Popjak, Hammersmith Hospital, London. Professor O. Jeger, Technical College, Zurich, will present a paper dealing with the more complex natural products belonging to the polyisopentane group.

The second group will be devoted to making and breaking of polymer molecules and will include 'The mechanico-chemistry of polymers' by Dr. L. Bateman, British Rubber Producers Research Association, 'Stereospecific polymerisations' by Professor H. F. Mark, Institute of Polymer Research, Brooklyn, 'Synthetic polypeptides as models for natural proteins' by Dr. C. H. Bamford, Courtaulds Ltd., and 'Plastics for use: designing molecules for particular purposes' by Dr. C. W. Bunn, ICI, Plastics division.

Chemistry in the service of agriculture will be the subject of the third group. Papers will include 'Introduction: the role of chemistry in production' by Mr. A. W. Marsden, Commonwealth Bureau of Dairy Science, 'The chemical evaluation of soil fertility' by Dr. T. Walsh, Department of Agriculture, Dublin, and 'Plant hormones' by Dr. P. W. Brian, Akers Research Laboratories, ICI. The title of a fourth paper has not yet been announced.

Presidential address in the chemistry section will be given by Dr. J. W. Cook, vice-chancellor, Exeter University, who will take as his subject 'Chemical approaches to the investigation of lung cancer'.

In addition to the lectures a full programme of visits to industries and other places of interest in and around Dublin has been arranged.

New Metallurgy Department

Building work is in progress at King's College, Percy Street, Newcastle-on-Tyne, to provide a department of metallurgy.

Chemical Additives In Food—2

Public Health and Practical Aspects of Antibiotic Usage

FEW technical developments in food processing had aroused more widespread interest and controversy than the proposal to use antibiotics as preservatives. So stated Dr. F. S. Thatcher, chief, microbiology laboratory, and Dr. C. A. Morrell, director of the Canadian Food and Drug Directorate, Department of National Health and Welfare, in their paper on 'Antibiotics in foods'.

As the authors pointed out, antibiotics were different from the many chemical additives used in foods today since their main use had been, and still was, in the prophylaxis or treatment of serious disease. The use of antibiotics in foods, therefore, could not be allowed to lessen their value and safety as very important items in the physicians' armamentarium.

The purpose of Thatcher and Morrell's paper was to discuss the practical and public health issues as related to the Food and Drugs Act of Canada. The questions before them were: First, did the introduction of such chemicals create a hazard to health? Second, did their introduction into foods offered for sale perpetrate a fraud? It had therefore been essential that justification for use of antibiotics in foods for human use should meet the challenge of a scientific appraisal. The outcome of scientific enquiry which was undertaken with particular reference to the tetracyclines was then reported.

Subject to Variables

Effectivity of antibiotics as food preservatives was subject to many variables such as (1) the nature of the food; (2) the initial degree of contamination of the food at the time of antibiotic treatment; (3) the generic type of dominant contamination; (4) the adequacy of sanitary and hygienic practices observed during processing and marketing of foods; (5) the antibacterial range of the antibiotic used.

Emphasis was laid on the finding that the use of antibiotics in foods which had been handled, processed or stored under conditions not in keeping with satisfactory standards of sanitation and hygiene could not be expected to have a significantly longer shelf-life.

Discussing the effects of antibiotics in foods, the authors said it was now clearly established that chlortetracycline and oxytetracycline when used in specific foods in accord with the recommendations from the promoting companies could exert a bacteriostatic effect against many bacteria and could delay the onset of bacteriological spoilage for a variable number of days depending on conditions of storage and the initial degree of contamination.

The mode of action of antibiotics aided the basis of selection of antibiotics for food preservation and could assist in evaluating some aspects of potential health hazards. It was pointed out that antibiotic substances varied widely in 'the range' of species and genera that are subject to them. Tetracyclines had been the subjects of initial choice for commercial food preservation since they were able to inhibit growth of bacteria among widely different taxonomic groups, including Gram-positive and Gram-negative bacteria, though not all members of either group. Penicillin, as it was mainly active against Gram-positive bacteria, was not satisfactory for food preservation, for a great many food-spoilage organisms were Gram-negative.

The authors considered the precise mechanisms involved in the antibacterial effects of antibiotics. Tetracyclines had been reported to inhibit several enzyme systems. Their 'uncoupling' effect in oxidative phosphorylation had been suggested as a basis for their bacteriostatic action. Other mechanisms inhibited included respiration, fatty acid oxidation, arginine catabolism, nitro-reduction, and adaptive enzyme formation. Since tetracyclines were known to be active dilating agents hypotheses had been advanced inferring that antibacterial action might result from the removal of essential cations from the environment of enzymes requiring metallic prosthetic groups, or that enzymes might be inactivated by reaction between the antibiotics and essential cations already attached to enzyme molecules.

Germane to appraisal of the safety of antibiotics in foods was the degree to which reactions inhibited in bacteria might be activated in mammalian cells if subject to prolonged exposures to antibiotics present as ingredients of a daily diet. Evaluation of antibiotics in foods was also rendered more obtuse by the various resistance phenomena demonstrated by micro-organisms. A further complication was the development of resistant populations induced by exposure to an antibiotic. Recent statements, it was reported, while rationally founded had little support in experience.

G. Taylor, past president, Society for Analytical Chemistry and Association of Public Analysts (left) with E. Voelcker, past president, Association of Public Analysts and Dr. J. H. Hamence, SAC president

It was pointed out that when the normal micro-ecology of a mixed population was disturbed by any selective process there was the risk that specific populations or species normally held in check by competitive microbial action might become dominant and could on occasion give rise to new forms of spoilage not normally encountered. Against this was the fact that incoming consignments of untreated foods would have had no previous contact with an antibiotic and hence would not receive repetitive exposure. This argument could be invalid, however, if contamination of foods occurred by resistant organisms which might have become endemic in ships, conduits, machinery, factories or in workers' clothing. Experience alone could determine the outcome of potential hazards.

Widespread experience in the use of tetracyclines in poultry and animal feeds did not seem to have given rise to undue problems from resistant pathogens it was stated.

A Warning

A warning was sounded that antibiotic-treated food should be processed and stored under favourable conditions of sanitation so that toxin formation did not occur. Strains of *C. botulinum* resistant to nisin and subtilin, antibiotics used experimentally as adjuncts to canning, had been discovered. Experiments on the use of antibiotics in canning were continuing.

Considering the toxicity of antibiotics and residues therefrom, Thatcher and Morrell said that each different antibiotic should be assessed independently. There was no evidence, according to investigators, to indicate that prolonged oral administration of chlortetracycline to man or domestic animals was harmful at present recommended doses.

The nature of the inactive decomposition products of the tetracyclines was poorly understood, as also the extent to which these occurred in foods during inactivation. Some were naphthol derivatives, and a substance 'iso-aureomycin' seemed to be a normal degradation product of chlortetracycline in animals, but which did not appear to be toxic.

While no direct studies to investigate carcinogenicity were known, it was believed that if carcinogenesis were a property of antibiotics, this fact would have been revealed during the very considerable clinical experience associated with antibiotic therapy.

Penicillin was known to induce various allergic responses but investigations with tetracyclines indicated that allergic reactions were rare if they occurred at all.

Reference was made to the effect of antibiotics in modifying intestinal flora. In the case of tetracycline, it had been reported that modifications which did occur were beneficial. Thatcher and Morrell, however, reported work where death from enterocolitis had resulted in chinchillas given chlortetracycline. Resistant staphylococci were isolated from the animals. Disturbances of intestinal flora therefore offered a strong argument in

favour of the restriction of the levels of antibiotics tolerable in foods to those levels which disappear completely during normal cooking of the specific foods. Data available showed that concentrations of tetracycline currently recommended for use in fish or poultry were effectively destroyed during normal cooking.

It was after careful review of the above evidence that the food and drug regulations in Canada had been amended to permit the use of very small amounts of chlortetracycline and oxytetracycline in the processing of fish and poultry for sale in that country.

Thatcher and Morrell stated that the following conclusions might be derived

L. Bacharach, Chairman, Sous-Commission on Antibiotics in Food, giving his paper, which was reported last week; p. 176.

from the review of the evidence studied:

1. The only antibiotics acceptable for use in the light of present knowledge were those with the following properties; namely, they (a) should possess a broad spectrum of antibacterial action, (b) should be non-toxic within acceptable limits of safety, (c) demonstrate no propensity to induce 'one-step' high-level resistance among a microbial population, (d) be non-carcinogenic, (e) non-allergenic, (f) stable for a sufficient period of time to exercise the desired effect, and (g) effective as preservatives for the purpose recommended.

2. Antibiotics, being compounds of pronounced biological activity whose nature was only partly understood, should be used only under careful surveillance.

3. Any permitted use in or on foods should be subject to repeal if (a) their microbiological selectivity gave rise to new or 'abnormal' spoilage or disease, and if (b) evidence for the significant increase in the prevalence of antibiotic resistant pathogens as a result of their use in foods became apparent.

4. Antibiotics should be allowed only in those foods and under social practices which would indicate cooking as the normal treatment for such foods, and when cooking would destroy the antibiotic present.

5. Evidence available to date supported the view that in Canada the foregoing conditions were met in respect to the allowance of a maximum of seven parts per million of chlortetracycline and oxytetracycline on poultry and five parts per million on fish, provided that the foods so treated were clearly labelled to that effect.

6. Any abuse in the use of antibiotics or any attempt to exceed the proper shelf-life of treated foods would need strict corrective action by authorities.

7. The use of antibiotics in foods should be coupled to increased effort to improve the practices of sanitation related to the processing and marketing of the foods concerned.

8. The use of antibiotics as preservatives in foods should be considered as a tentative venture since final conclusions on specific aspects of the value and safety of the practice could only be determined after much greater experience.

9. Each and every antibiotic proposed for use in foods had to be considered on its own merits for the purpose recommended and in relation to its continued value in the medical field.

DR. WELCH DISCUSSES USE OF ANTIBIOTICS IN US INDUSTRY

EXTENSION of the uses of antibiotics to fields other than prophylaxis and therapy of human disease has magnified the problems of the US Food and Drug Administration. This was stated by Dr. Henry Welch, director, antibiotics division, Food and Drug Administration, US Department of Health, Education and Welfare in his paper on 'Control of antibiotics in food'.

Dr. Welch said that antibiotics were being used in animal nutrition for promotion of growth in swine, chicks and poults. Therapeutic and prophylactic use of antibiotics was made in animals such as cows, pigs, chicks, etc. These drugs were also being used as crop sprays to prevent blight on various fruits, and as preservatives for fish, meat, chicken, vegetables and other perishables.

Antibiotics used for growth stimulation were usually present in feed in amounts of 5 to 20 p.p.m. Used in these quantities antibiotic was not found in blood or tissues of the treated animals. Where 50 to 200 p.p.m. were used for prophylactic or therapeutic purposes in chicks or poults, residues had been demonstrated while the animal was being fed these high concentrations. However, antibiotics were rapidly excreted when administration ceased. As used in crops in the US, antibiotics were dissipated before the edible portion of the plant was formed.

Extensive Research

Mention was made by Dr. Welch of the extensive research which had been conducted to explore the potentialities of antibiotics as food preservatives. At the end of 1955, the US FDA had approved the use of chlortetracycline in the preservation of raw poultry. Tolerance in the raw bird for the chemical was established at 7 parts per million in any part of the bird. No significant residue of the antibiotic could be found in the bird after cooking by broiling, frying, boiling, or baking. A considerable number of investigative studies of the value of antibiotics in preserving of fish and meats had also been completed.

It was emphasised by Dr. Welch that the actual or potential introduction of antibiotics into food supplies posed the same problem as did the use of any other chemical. This growing use of chemicals in food was one of the most serious problems facing the FDA at the present time. Dr. Welch pointed out that in addition to the planned introduction of antibiotics into the food supply, these drugs might also find their way into foods indirectly. This had occurred with milk when cows had been treated with antibiotics for mastitis. In fact, it was estimated that more than 75 tons of antibiotics were used yearly in the treatment of this condition.

Experience had shown, Dr. Welch reported, that substantially the entire amount of infused antibiotic was eliminated by regular milking over a period of three days. Failure to allow for this period and discarding the milk from treated cows was largely responsible for antibiotic residues in the milk supply.

Results of Surveys

The results of three surveys, in 1954, 1955, and 1956, made to determine the antibiotic content of milk were quoted by Dr. Welch. In the first survey 3.2 per cent of 94 quarts of milk was positive for penicillin. In the second survey, of 474 samples tested, 11.6 per cent contained penicillin. Concentration varied from 0.003 unit/ml. to 0.08 unit/ml. (with 80 units/l. as the highest). In the most recent survey, 1,706 samples were examined and penicillin was found to be present in 5.9 per cent of the samples. Concentrations ranged from .0.003 to 0.550 unit/ml. (highest amount, 550 units/l.). One penicillin positive sample showed streptomycin activity and 17 samples (approximately 1 per cent) appeared to contain bacitracin, or a combination of these drugs. The presence of penicillin was confirmed by the penicillinase identity test; the other antibiotics could not be specifically identified.

Because of the marked increase in the number of positive samples in the year between surveys I and II advice was sought from 30 authorities in the field of antibiotic therapy, allergy and paediatrics. The majority of the experts expressed the belief that the amounts found in the milk were unlikely to modify the human oral or intestinal flora, cause the emergence of resistant strains, or provoke sensitisation of an insensitive person. They felt, however, that such concentrations might cause a reaction in a highly sensitive individual.

In the US it was estimated, said Dr. Welch, that 10 per cent of the population was susceptible to sensitisation, although there was great variability in sensitisation. As all the antibiotics used in mastitis preparations, except penicillin, had a low sensitisation potential, and none had been so widely associated with fatal allergic reactions as penicillin, this latter was of major concern.

A medical advisory panel of the US

FDA formed to discuss health hazards due to the use of antibiotics in cow mastitis considered that tetracyclines, bacitracin, polymyxin, and neomycin, all of which may be found in mastitis preparations, did not pose a health problem.

Dr. Welch informed the conference that through co-operation with the US Department of Agriculture farmers were being informed of the importance of not using milk for human consumption from cows receiving antibiotic therapy. In January of this year, a Federal Register notice of a proposal was published concerning a warning statement required on antibiotic drugs intended for intramammary infusion and on 9 February a notice was published in the Federal Register limiting the penicillin content of mastitis preparations to 100,000 units per dose.

His department was now concerned, said Dr. Welch, with considerations regarding the use of chlortetracycline and oxytetracycline in fish as a means of extending 'shelf-life'. Ordinary methods of cooking, however, eliminated the antibiotic and in any event some fish were eaten raw. Therefore, before tolerances could be established for these antibiotics, it would be necessary to demonstrate that the residues found were not dangerous to public health. In the US, it was planned to move slowly and cautiously with each new proposal concerning antibiotics in foods.

'Dangers of Chemical Additives Much Exaggerated' — Dr. Oser

THE DANGERS of chemical additives in food had been exaggerated out of all proportion to their value, particularly when considered alongside the dangers of alcohol and tobacco. This was stated by *Dr. Bernard L. Oser*, director, Food Research Laboratories, Inc., Long Island City, New York, in the discussion period following the afternoon session.

Dr. Oser said he had had the opportunity of reading all the papers given at the conference and he wished to point out that 'in this highly technical chemical age antibiotics are only a special case of chemical additives, such as antioxidants or radioactive substances'. He remarked that foods were seldom eaten at first sight, but were packed, stored and sent to various destinations.

Mr. Bacharach had pointed out that much of the evidence available was new and required assessment. Thatcher and Morrell, in their paper, had said that antibiotics as food additives were of little use where sanitary conditions were poor. But there was no doubt that legislation should be tightened up.

Carcinogenesis

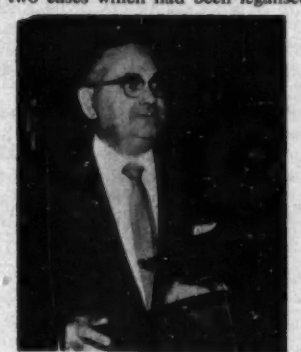
Food additives and carcinogenesis had been mentioned. The cry of cancer was based on speculative fears, said Dr. Oser. There were persons who had some idea that a carcinogenic substance was readily detected, but that manufacturers were not interested, for good reason, in investigating this. This was not so.

There was also the problem of different species of animals used in biological tests.

As Dr. Welch had stated in his paper, education of the public was needed to point out the dangers of food additives and otherwise.

Concluding, Dr. Oser considered that a law which defined that ingredients allowed should be stated, but which did not enforce that these should be placed on the label, was of no value.

The only other speaker at the afternoon session discussion was *Dr. E. Ingrams*, who referred to the paper by Dr. Thatcher and Dr. Morrell. They had made the point in their paper that the criterion for an antibiotic was that it should not produce an abnormal spoilage flora. Dr. Ingrams stated that that flora was never normal, if enough antibiotic was used to serve a useful purpose. In the two particular cases of using chlortetracycline—for fish and poultry, the two cases which had been legalised in



Dr. B. L. Oser, director Food Research Laboratories, Inc.

the US—the evidence was particularly plain that the flora was changed from a bacterial one to one of yeasts and there seemed to be no kind of information as to what kinds of yeasts they were. He therefore wished to know what their statement meant.

Mr. Charles Adams, who had read the paper in the absence of the authors, did not feel competent to answer the question. Sir Harry Jephcott, chairman, then enquired whether Mr. John L. Harvey might care to reply, or Dr. Oser, but both these gentlemen declined .A note of the question was therefore taken for the record.

Mr. Bacharach then asked if any effective preservative added to food altered the spoilage pattern. This question was also recorded, but not answered.

Summing up the conference *Mr. C. W. Dunn*, speaking on behalf of the Food Law Institute of the US, said that the hospitality shown to the US speakers and visitors at the conference was deeply appreciated. He thanked the committee who had organised such an excellent meeting. He felt that special reference should be made to Dr. A. J. Amos who had worked indefatigably for the success of the conference.

In the light of the experience of this conference, he suggested that a skeleton organisation be set up to organise a similar conference very soon. He thought that London could very well be chosen for the venue and he would guarantee to bring over the leaders in the US Food and Drug Administration.

Sir Harry Jephcott said he believed that it was the first time that papers had been presented on the subject of food additives at a conference by Great Britain, Canada and the US. There would be a lot of valuable experience and data available in all these countries. He therefore hoped that this conference would be considered the 'more formal opening' to be followed by other meetings where people who were facing the same problems as had been indicated by the conference, would get together to express their views.

'Let us please share all the information we can so that we may produce the best results,' Sir Harry stated.

Mr. E. Voelcker, a past president of the Association of Analytical Chemists, considered that he had rarely listened to seven more interesting papers. The discussion had shown the keen interest that was taken in analysis of food.

He expressed the conference's indebtedness to Mr. Wesley Dunn, and to Sir Harry Jephcott for introducing the papers.

Polyester/Glass Moulds for Concrete

MOULDS for producing reinforced concrete slabs and other shapes are being made from polyester/glass. Concrete Utilities Ltd., of Great Amwell, Herts, manufacture them for the trade and already have a number in regular use at their works. The moulds are made from Bakelite polyester resin reinforced with glass fibre.

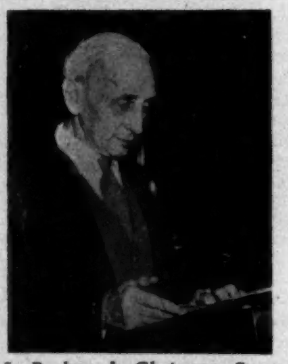
These moulds are resistant to corrosion and abrasion and are extremely light when compared with, for example, steel. Release of the concrete is claimed to be easier from a polyester/glass mould and a better surface is obtained.

Moulds used by Concrete Utilities Ltd. for making reinforced concrete brackets for street lighting columns. Bakelite polyester resin is used reinforced with glass fibre

favour of the restriction of the levels of antibiotics tolerable in foods to those levels which disappear completely during normal cooking of the specific foods. Data available showed that concentrations of tetracycline currently recommended for use in fish or poultry were effectively destroyed during normal cooking.

It was after careful review of the above evidence that the food and drug regulations in Canada had been amended to permit the use of very small amounts of chlortetracycline and oxytetracycline in the processing of fish and poultry for sale in that country.

Thatcher and Morrell stated that the following conclusions might be derived



L. Bacharach, Chairman, Sous-Commission on Antibiotics in Food, giving his paper, which was reported last week; p. 176.

from the review of the evidence studied:

1. The only antibiotics acceptable for use in the light of present knowledge were those with the following properties; namely, they (a) should possess a broad spectrum of antibacterial action, (b) should be non-toxic within acceptable limits of safety, (c) demonstrate no propensity to induce 'one-step' high-level resistance among a microbial population, (d) be non-carcinogenic, (e) non-allergenic, (f) stable for a sufficient period of time to exercise the desired effect, and (g) effective as preservatives for the purpose recommended.

2. Antibiotics, being compounds of pronounced biological activity whose nature was only partly understood, should be used only under careful surveillance.

3. Any permitted use in or on foods should be subject to repeal if (a) their microbiological selectivity gave rise to new or 'abnormal' spoilage or disease, and if (b) evidence for the significant increase in the prevalence of antibiotic resistant pathogens as a result of their use in foods became apparent.

4. Antibiotics should be allowed only in those foods and under social practices which would indicate cooking as the normal treatment for such foods, and when cooking would destroy the antibiotic present.

5. Evidence available to date supported the view that in Canada the foregoing conditions were met in respect to the allowance of a maximum of seven parts per million of chlortetracycline and oxytetracycline on poultry and five parts per million on fish, provided that the foods so treated were clearly labelled to that effect.

6. Any abuse in the use of antibiotics or any attempt to exceed the proper shelf-life of treated foods would need strict corrective action by authorities.

7. The use of antibiotics in foods should be coupled to increased effort to improve the practices of sanitation related to the processing and marketing of the foods concerned.

8. The use of antibiotics as preservatives in foods should be considered as a tentative venture since final conclusions on specific aspects of the value and safety of the practice could only be determined after much greater experience.

9. Each and every antibiotic proposed for use in foods had to be considered on its own merits for the purpose recommended and in relation to its continued value in the medical field.

DR. WELCH DISCUSSES USE OF ANTIBIOTICS IN US INDUSTRY

EXTENSION of the uses of antibiotics to fields other than prophylaxis and therapy of human disease has magnified the problems of the US Food and Drug Administration. This was stated by Dr. Henry Welch, director, antibiotics division, Food and Drug Administration, US Department of Health, Education and Welfare in his paper on 'Control of antibiotics in food'.

Dr. Welch said that antibiotics were being used in animal nutrition for promotion of growth in swine, chicks and poults. Therapeutic and prophylactic use of antibiotics was made in animals such as cows, pigs, chicks, etc. These drugs were also being used as crop sprays to prevent blight on various fruits, and as preservatives for fish, meat, chicken, vegetables and other perishables.

Antibiotics used for growth stimulation were usually present in feed in amounts of 5 to 20 p.p.m. Used in these quantities antibiotic was not found in blood or tissues of the treated animals. Where 50 to 200 p.p.m. were used for prophylactic or therapeutic purposes in chicks or poults, residues had been demonstrated while the animal was being fed these high concentrations. However, antibiotics were rapidly excreted when administration ceased. As used in crops in the US, antibiotics were dissipated before the edible portion of the plant was formed.

Extensive Research

Mention was made by Dr. Welch of the extensive research which had been conducted to explore the potentialities of antibiotics as food preservatives. At the end of 1955, the US FDA had approved the use of chlortetracycline in the preservation of raw poultry. Tolerance in the raw bird for the chemical was established at 7 parts per million in any part of the bird. No significant residue of the antibiotic could be found in the bird after cooking by broiling, frying, boiling, or baking. A considerable number of investigative studies of the value of antibiotics in preserving of fish and meats had also been completed.

It was emphasised by Dr. Welch that the actual or potential introduction of antibiotics into food supplies posed the same problem as did the use of any other chemical. This growing use of chemicals in food was one of the most serious problems facing the FDA at the present time. Dr. Welch pointed out that in addition to the planned introduction of antibiotics into the food supply, these drugs might also find their way into foods indirectly. This had occurred with milk when cows had been treated with antibiotics for mastitis. In fact, it was estimated that more than 75 tons of antibiotics were used yearly in the treatment of this condition.

Experience had shown, Dr. Welch reported, that substantially the entire amount of infused antibiotic was eliminated by regular milking over a period of three days. Failure to allow for this period and discarding the milk from treated cows was largely responsible for antibiotic residues in the milk supply.

Results of Surveys

The results of three surveys, in 1954, 1955, and 1956, made to determine the antibiotic content of milk were quoted by Dr. Welch. In the first survey 3.2 per cent of 94 quarts of milk was positive for penicillin. In the second survey, of 474 samples tested, 11.6 per cent contained penicillin. Concentration varied from 0.003 unit/ml. to 0.08 unit/ml. (with 80 units/l. as the highest). In the most recent survey, 1,706 samples were examined and penicillin was found to be present in 5.9 per cent of the samples. Concentrations ranged from .0.003 to 0.550 unit/ml. (highest amount, 550 units/l.). One penicillin positive sample showed streptomycin activity and 17 samples (approximately 1 per cent) appeared to contain bacitracin, or a combination of these drugs. The presence of penicillin was confirmed by the penicillinase identity test; the other antibiotics could not be specifically identified.

Because of the marked increase in the number of positive samples in the year between surveys I and II advice was sought from 30 authorities in the field of antibiotic therapy, allergy and paediatrics. The majority of the experts expressed the belief that the amounts found in the milk were unlikely to modify the human oral or intestinal flora, cause the emergence of resistant strains, or provoke sensitisation of an insensitive person. They felt, however, that such concentrations might cause a reaction in a highly sensitive individual.

In the US it was estimated, said Dr. Welch, that 10 per cent of the population was susceptible to sensitisation, although there was great variability in sensitisation. As all the antibiotics used in mastitis preparations, except penicillin, had a low sensitisation potential, and none had been so widely associated with fatal allergic reactions as penicillin, this latter was of major concern.

A medical advisory panel of the US

FDA formed to discuss health hazards due to the use of antibiotics in cow mastitis considered that tetracyclines, bacitracin, polymyxin, and neomycin, all of which may be found in mastitis preparations, did not pose a health problem.

Dr. Welch informed the conference that through co-operation with the US Department of Agriculture farmers were being informed of the importance of not using milk for human consumption from cows receiving antibiotic therapy. In January of this year, a Federal Register notice of a proposal was published concerning a warning statement required on antibiotic drugs intended for intramammary infusion and on 9 February a notice was published in the Federal Register limiting the penicillin content of mastitis preparations to 100,000 units per dose.

His department was now concerned, said Dr. Welch, with considerations regarding the use of chlortetracycline and oxytetracycline in fish as a means of extending 'shelf-life'. Ordinary methods of cooking, however, eliminated the antibiotic and in any event some fish were eaten raw. Therefore, before tolerances could be established for these antibiotics, it would be necessary to demonstrate that the residues found were not dangerous to public health. In the US, it was planned to move slowly and cautiously with each new proposal concerning antibiotics in foods.

'Dangers of Chemical Additives Much Exaggerated' — Dr. Oser

THE DANGERS of chemical additives in food had been exaggerated out of all proportion to their value, particularly when considered alongside the dangers of alcohol and tobacco. This was stated by *Dr. Bernard L. Oser*, director, Food Research Laboratories, Inc., Long Island City, New York, in the discussion period following the afternoon session.

Dr. Oser said he had had the opportunity of reading all the papers given at the conference and he wished to point out that 'in this highly technical chemical age antibiotics are only a special case of chemical additives, such as antioxidants or radioactive substances'. He remarked that foods were seldom eaten at first sight, but were packed, stored and sent to various destinations.

Mr. Bacharach had pointed out that much of the evidence available was new and required assessment. Thatcher and Morrell, in their paper, had said that antibiotics as food additives were of little use where sanitary conditions were poor. But there was no doubt that legislation should be tightened up.

Carcinogenesis

Food additives and carcinogenesis had been mentioned. The cry of cancer was based on speculative fears, said Dr. Oser. There were persons who had some idea that a carcinogenic substance was readily detected, but that manufacturers were not interested, for good reason, in investigating this. This was not so.

There was also the problem of different species of animals used in biological tests.

As Dr. Welch had stated in his paper, education of the public was needed to point out the dangers of food additives and otherwise.

Concluding, Dr. Oser considered that a law which defined that ingredients allowed should be stated, but which did not enforce that these should be placed on the label, was of no value.

The only other speaker at the afternoon session discussion was *Dr. E. Ingrams*, who referred to the paper by Dr. Thatcher and Dr. Morrell. They had made the point in their paper that the criterion for an antibiotic was that it should not produce an abnormal spoilage flora. Dr. Ingrams stated that that flora was never normal, if enough antibiotic was used to serve a useful purpose. In the two particular cases of using chlortetracycline—for fish and poultry, the two cases which had been legalised in

Dr. B. L. Oser, director Food Research Laboratories, Inc.

the US—the evidence was particularly plain that the flora was changed from a bacterial one to one of yeasts and there seemed to be no kind of information as to what kinds of yeasts they were. He therefore wished to know what their statement meant.

Mr. Charles Adams, who had read the paper in the absence of the authors, did not feel competent to answer the question. Sir Harry Jephcott, chairman, then enquired whether Mr. John L. Harvey might care to reply, or Dr. Oser, but both these gentlemen declined .A note of the question was therefore taken for the record.

Mr. Bacharach then asked if any effective preservative added to food altered the spoilage pattern. This question was also recorded, but not answered.

Summing up the conference *Mr. C. W. Dunn*, speaking on behalf of the Food Law Institute of the US, said that the hospitality shown to the US speakers and visitors at the conference was deeply appreciated. He thanked the committee who had organised such an excellent meeting. He felt that special reference should be made to Dr. A. J. Amos who had worked indefatigably for the success of the conference.

In the light of the experience of this conference, he suggested that a skeleton organisation be set up to organise a similar conference very soon. He thought that London could very well be chosen for the venue and he would guarantee to bring over the leaders in the US Food and Drug Administration.

Sir Harry Jephcott said he believed that it was the first time that papers had been presented on the subject of food additives at a conference by Great Britain, Canada and the US. There would be a lot of valuable experience and data available in all these countries. He therefore hoped that this conference would be considered the 'more formal opening' to be followed by other meetings where people who were facing the same problems as had been indicated by the conference, would get together to express their views.

'Let us please share all the information we can so that we may produce the best results,' Sir Harry stated.

Mr. E. Voelcker, a past president of the Association of Analytical Chemists, considered that he had rarely listened to seven more interesting papers. The discussion had shown the keen interest that was taken in analysis of food.

He expressed the conference's indebtedness to Mr. Wesley Dunn, and to Sir Harry Jephcott for introducing the papers.

Polyester/Glass Moulds for Concrete

MOULDS for producing reinforced concrete slabs and other shapes are being made from polyester/glass. Concrete Utilities Ltd., of Great Amwell, Herts, manufacture them for the trade and already have a number in regular use at their works. The moulds are made from Bakelite polyester resin reinforced with glass fibre.

These moulds are resistant to corrosion and abrasion and are extremely light when compared with, for example, steel. Release of the concrete is claimed to be easier from a polyester/glass mould and a better surface is obtained.

Moulds used by Concrete Utilities Ltd. for making reinforced concrete brackets for street lighting columns. Bakelite polyester resin is used reinforced with glass fibre

THE URGENT present-day need for closer international co-operation between students, teachers and research workers lends importance to the question of university interchange. In this context it is interesting to learn that Belgium, France Germany and the UK plan to introduce in the next academic session a new scheme for the exchange of longer teaching visits of one term or semester. The UK has also taken part in a new scheme to assist younger research workers to further their investigations by personal contact with others working in the same field abroad.

This is stated in a report covering the period 1948–1956 issued by the Committee for Foreign University Interchange and published by the British Council. During the eight years 551 visits have been arranged under the interchange scheme and they have produced a total of 985 contacts between the participating European universities.

At present, a yearly interchange of 63 visits is carried out between the UK and 14 European countries; this year it is planned to extend the scheme by the inclusion of three new countries—Denmark, Turkey and Poland.

In the field of postgraduate scholarships, 684 students from the Continent have been given awards by the British Council for study in the UK, while 549 British students have been helped by foreign governments or universities to study on the Continent.

THE NORWEGIANS have developed a method for hunting whales which Alembic considers must be unique. When the harpoon hits the whale the shell releases 2.5 cu. metres of carbon dioxide which spreads through the whale's body and kills it, so the claim goes, in two seconds presumably by embolism. The gas then causes the whale to float to the surface without air having to be pumped into it.

Alembic wonders if the technique has any other applications. He has visions of intrepid hunters trekking through darkest Africa followed by bearers carrying guns, bombs, cylinders and gas-generating plant all made by a well-known company.

WHAT IS probably a unique export sales technique has been adopted by Rocol Ltd., of Swillington, near Leeds. Under the direction of chairman, Captain F. C. Wayman, the export department has started a system for broadening the experience of the company's home salesmen and of overseas agents.

A series of regular overseas visits of home sales staffs to agents overseas has begun with Mr. K. Pollard, who covers Nottingham, Leicester and Derby, visiting the Rocol agent in Sweden. He is to give demonstrations and advice on the company's molybdenised lubricants, RTD machining compound and other special lubricants to Swedish firms, Government departments and other authorities.

It is hoped that by the middle of next year, similar staff assistance will have been given to all foreign agents in more than 30 countries. This system of visits, which the company confidently expect will benefit the mounting curve on the export sales graph, is in addition to existing export activities.

ALEMBIC who was particularly interested in Mr. P. A. Holt's recent reference to a new woollen textile finish said to be proof against oily or fatty stains (see Distillates, last week) sought more details. Finishes of this type, however, are in a very preliminary stage of development.

The finish is based on a product known commercially as Scotchgard and has been introduced into this country by the Minnesota Mining and Manufacturing Co. Ltd. The precise nature of the constituent of the finish has not yet been revealed, but it is known to be a chemical from the fluorocarbon field.

The Bradford Dyers Association Ltd., Well Street, Bradford, of which Mr. Holt is managing director, have been able to confirm that the material produces 'rather remarkable oil-repellent properties when applied to certain woollen fabrics'.

Unfortunately this interesting material is not at present available in this country.

WHEN DOES a chemical manufacturer drop a product? Obsolescence is the commonest reason according to E. I. du Pont de Nemours and Co., Wilmington, Delaware. The old product often succumbs when du Pont or one of its more than 10,000 competitors comes up with a new line that does a job better, more cheaply or more safely.

In the last four years, the company has deleted more than 120 products; at the same time a comparable number of new ones have been added to the du Pont range.

Among those dropped are: roasting barytes ore, replaced for the production of lithopone by titanium dioxide, a whiter white pigment; cellulose nitrate film, dropped when a nonflammable cellulose acetate base was developed, which is now challenged by Cronar polyester photographic film base; Erifon flame retardant because it was too expensive to apply to fabrics; aromatics, which could not feasibly be made by modern methods; DDT, because competitors' manufacturing costs were lower (du Pont have developed less toxic methoxychlor insecticide); and Cel-O-Glass plastics-coated wire because a smaller firm could sell it for less and still make a better profit.

HOW NEW chemicals can help to preserve ancient craftsmanship is told in *Beetle Bulletin* 7, the lavish magazine produced by British Industrial Plastics. Lock gates are still made of their traditional material, wood, since only wood with its inherent elasticity can take the shock of a 30-ton barge travelling at 3 m.p.h.

Until recently, the flush planking of these gates has been held in place by 80 cold rivets, handwrought at the Ockerhill workshops of the British Waterways (SW division). New developments in synthetic resins have made this unnecessary and now all mortices and planking are glued with Beetle W2, which eliminates the need for rivets. Beetle cement A is used for glueing mortices and panelling.

BRITISH RAILWAYS now run a number of 'weed-killing specials' over their tracks. This is a full-time operation, for uncontrolled growth of weeds in track beds would upset their even distribution. A firm that has specialised in the production of herbicides for some 27 years is Chipman Chemical Co. Ltd., of 2 Caxton Street, London SW1. It has a department that deals specifically with weeds on industrial sites, sidings, etc. Their range includes the non-poisonous Atlacide Chipko 3 selective weedkiller and many 'tailor-made' formulations designed to meet individual circumstances.

After full investigation of the varying degrees of infestation, fire risks and application methods, this enterprising company now has a free loan scheme for an initial period to demonstrate the most effective means of tackling each problem.

ALEMBIC has heard it rumoured in atomic circles that the new managing director of the Industrial Group of the Atomic Energy Authority is to be Sir Leonard Owen. Sir Leonard, who was knighted in the last New Year Honours List, is at present deputy managing director of the Industrial Group.

The present managing director, Sir Christopher Hinton, is leaving the Authority on 1 September to become chairman of the newly formed Central Electricity Generating Board. This body was set up under the Electricity Act 1957 to exercise a sharper and more effective control over the generation of electricity, and Sir Christopher will have, in the words of Sir Edwin Plowden, 'the responsibility of exploiting the industrial possibilities of atomic power stations built on the pattern of Calder Hall'.

Alembic

'Unexplored Field' of High Temperature Chemistry

Final Review of Paris Congress

THIS report by our special correspondent completes his review of the 16th congress of the International Union of Pure and Allied Chemistry held recently in Paris. Previous reports have appeared in CHEMICAL AGE for 3 August and 27 July.

In spite of the work that has been done in the field of high temperature chemistry since its opening by Henri Moissan, it was a largely unexplored field. This was stated by Professor Leo Brewer, University of California, Berkeley, US, in his lecture, 'High temperature chemistry, a pioneering field'. Recent events had shown that experience at low temperatures could not be safely extrapolated to higher temperatures. In most systems not even the major chemical species that were present were known.

From knowledge of the few systems that had been studied, the pattern of behaviour that was probably typical of most systems could be described. As the temperature was increased, chemical changes took place which converted the characteristic compounds that were of chemical importance at room temperature to new compounds that were usually different from those found at room temperature. The term 'high temperature' as used by the Professor would not be designated in terms of a temperature scale. Instead, high temperature chemistry of a given chemical system was stated to refer to the chemistry at those temperatures that were high enough to produce compounds that were unexpected from the room temperature behaviour.

Although reliable thermodynamic calculations could not be carried out when the major chemical species in a system were not known, some general thermodynamic principles would still apply that could limit the behaviour to be expected in high temperature systems.

Professor Brewer then outlined the broad principles that would be of value in directing profitable activity of the pioneering work that was required.

Work on High Melting Glass Fibres

Research on the production of high melting glass fibres had been conducted by A. Silverman, University of Pittsburgh, US, since 1951. 'High melting fibres' was therefore the title of the lecture given by Professor Silverman. He said that high melting oxides and minerals and their mixtures have been changed to glass directly, as no classical glass-melting furnaces were capable of attaining the necessary temperatures. The raw materials were mixed with suitable binders, wetted and converted to a plastic mass that was extruded downwards, in continuous rods or tubes, by a screw feed. These, on descending, were dried and baked by convection currents and then passed through suitably designed high-temperature burners. The lower end of the baked extruded material was melted instantly and homogeneously to glass which was either blown by compressed air or steam into bulk fibres or drawn into monofilaments.

Professor Silverman reported that a pilot plant had already produced 200 lb. per day of superior bulk fibre which had remained unchanged after baking for 2.5 days at 2,350°F. and being subsequently stored for three years. These fibres were longer, softer, more durable than any others of approximately their type resulting from earlier efforts in the fibre glass field. The capacity of the production unit could be increased to one ton per day.

It was stated by the lecturer that researches were underway toward the production of fibres with melting points up to and beyond 5,000°F. Special heating systems were under consideration besides oxygen-acetylene. The entire principle depended on the very rapid passing of transition points, and the retention of high-temperature properties.

The products were intended largely for use in jet craft and guided missiles.

Chemistry of Organometallic Compounds

'Complex formation and reactivity in the chemistry of organometallic compounds', was the subject on which Professor Georg Wittig, Heidelberg University, lectured. He stated that lithium organic complexes tended to associate between themselves. Thus lithium phenyl formed $Li(Li(C_6H_5)_2$ in which one lithium ion was attracted electrostatically into the complex. It was also possible to form compounds of the type $Na(Li(C_6H_5)_2$ which was stable in ether. Ether solvated the Li^+ cation. Proceeding along the periodic table stability increased: Thus $Li(Li(C_6H_5)_2)$ was less stable than $Li(Be(C_6H_5)_3)$, which was less stable than $Li(B(C_6H_5)_4)$. The last named could be dissolved in water. Descending a periodic group, however, caused stability of these complexes to decrease. Thus aluminium gave less stable complexes than boron.

The ability to form complexes, said Professor Wittig, seemed to depend on the ability of the central atom to complete its outer electron shell to an octet. Beyond the first group, however, these could be further expanded. Thus phosphorus could form PF_5. Complexes of the type $(C_6H_5)_4Z^+$ hal^- were known corresponding to the quaternary ammonium salts. (Z = P, As, Sb, Bi.)

With these higher groups in the periodic table stability was found to decrease. Thus Ph_5Sb was more stable than Ph_4Te, which in turn had greater stability than Ph_3I (Ph = C_6H_5).

The complexes could be divided into two classes according to whether the central atom was a doublet acceptor or donor. They were denoted 'ate' complexes as (in $R_3B\leftarrow R$) Me or 'onium' complexes as ($R_3N\rightarrow R$) hal. Professor Wittig suggested that most examples of complex formation among organometallic compounds could be explained on this basis. The order of stability of 'ate' complexes decreased with increasing atomic radius and decreasing valency of the central atom. Thus: B, Al, Be, Mg, Li.

The speaker discussed the probable cause of a number of organic reactions. He pointed out that complex formation could have a very profound effect on organic reactions, especially in those cases where the action of organometallic compounds was a catalytic one.

Inorganic Compounds of Germanium

Professor Hans Nowotny, of the Institute of Physical Chemistry, Vienna, discussed 'Inorganic compounds of germanium'. He remarked that germanium, although considered one of the rarer elements, was estimated to comprise 4 to 7 $\times$ 10^{-4} per cent of the earth's crust. First used about a decade ago as a crystal amplifier, interest in its chemistry had extended considerably, particularly as a semi conductor. In general, its chemistry was rather closer to that of silicon than that of tin. A potential use for germanium was as a constituent of solders for light metals.

In the germanides (analogous to the silicides) the element was very definitely anionic, said Professor Nowotny. Compounds included Na_4Ge^4: calcium silicide and calcium germanide had similar crystal structures. Germanides of thorium and uranium were known.

Many metallic germanides rich in metal were known. Their formula depended on crystal structure and they did not follow normal valency laws. Copper germanides had anti-corrosive properties.

Germanium dioxide existed in two forms, a soluble (quartz) type, and an insoluble (rutile) type. The factors involved in solubility had not been completely determined, but the 'solution', Professor Nowotny thought, was probably a colloidal molecular dispersion, and he suggested that the residual 3.3 per cent of water which was present was actually water of crystallisation. The alkali germanates were known and complex compounds such as $Na_2H_2GeO_7.,6H_2O$ had been studied. Crystal structure of many of these germanates had also been studied, and a series of zeolites containing germanium was known.

Studying Fast Reactions with Mass Spectrometry

The value of mass spectrometry in studying fast reactions was emphasised by Professor Cyrias Ouellet, Laval University, Quebec, in his paper entitled 'The study of fast reactions by mass spectrometry'. Thus methyl radicals formed by decomposition of $Pb(CH_3)_4$ could be detected.

Details considered by Professor Ouellet were that all ions of the same m/e ratio were focused on a collector slit. A spectrum was obtained, and the peaks indicate

where absorption had taken place. For accuracy it was essential that absorption energy was much greater than ionisation potentials. Peaks were produced by OH^+, O^+ and many other radicals.

Low pressures of the order of 10^{-4} mm. Hg. were necessary, but reactions had been studied at higher pressures: in these reactions, stated Professor Ouellet, the gas left the reaction zone by effusion through a microscopic hole in a thin wall and reached the ionisation chamber as a quasi molecular stream. By these techniques it had been possible to identify free radicals and to measure their concentrations, ionisation potentials and reaction rates.

Prelog on Transannular Effects

'Investigations on transannular effects in elimination and substitution reactions by tracer techniques' were dealt with by Professor Vladimir Prelog, Federal Polytechnic School, Zurich, Switzerland.

The speaker stressed that classical organic chemistry was based on the principle of least structural change during a reaction. However, even in the simplest reactions, it was known that rearrangements occur. This was particularly the case where carbonium ions are known to be formed in the intermediate stages of a reaction. Although this was recognised very early in terpene chemistry, it was not until the advent of tracer techniques using tracer isotopes that the frequency of 1:2 hydride ion shifts during substitution reactions was realised. 1:3 and even 1:6 shifts are possible.

It had been found that with this technique the oxidation of certain stereoisomeric olefines using osmium tetroxide always proceeded stereospecifically. These phenomena could be explained on the basis of a transannular change of hydride, deuterium being used to label specific atoms.

Carbon 14 had also been used very extensively in determining transannular changes. It was indicated how the course of certain reactions, such as the solvolysis of cycloalkalnyl (cyclanyl) p-toluene sulfonates and the nitrous acid de-amination of cycloalkanylamines could be followed using isotopically labelled compounds. It was found that these reactions proceed in non-classical fashion, i.e., there was a shift of hydride ion from a carbon which was not originally substituted. This shift was most marked in cycloalkane rings consisting of eight, nine, or ten carbon atoms and products which are either cis-or trans-diols are formed by oxidation with the diols in the: 1:4, 1:5, or 1:6 positions instead of the expected 1:2 diols.

Dependence of the reaction course on ring size, which effects steric factors and energy relationships, was discussed. A conclusion which could be drawn was that carbon atoms which should be inert, would in practice react rapidly and stereospecifically because of special spatial considerations.

Photoreactions of Organic Dyes

The closing lecture of the conference was on 'Electronic photoreactions of organic dyes' by Professor Alexander Terenin, Academy of Sciences, Moscow, who said that measurements of potential and conductivity, carried out during reversible photochemical reactions of dyes of the chlorophyll type in liquid media, led to detection of primary formation of ion-radicals, due to an electron transfer, and the secondary step of a proton transfer. The method was useful in studying various oxidation and reduction photochemical reactions.

In the same way, by measuring the potential of a layer of the same dyes on an illuminated electrode, dipping in electrolyte solutions, the nature of the primary surface photoreactions could be determined visually.

It is reported that for various dyes, adsorbed on inorganic semiconductors, an energy transfer took place, electrons being removed from the semiconductor surface.

The mechanism and kinetics of photochemical reactions could thus be studied efficiently by electrical measurements.

A NEW CERAMIC ENGINEERING MATERIAL — PYROCERAM

A NEW CLASS of extremely hard fine-grained crystalline materials, Pyroceram, developed by Corning Glass Works, US was referred to in CHEMICAL AGE, 1 June, p. 936. Almost unlimited applications seem possible with this unique material, by virtue of its combination of desirable physical, thermal and electrical properties.

Pyroceram is described as essentially a crystalline material formed from a non-crystalline glass. A glass batch containing one or more typical nucleating agents, such as gold, silver and copper, is melted, formed and cooled. Subsequent heat treatment causes these agents to produce many millions of sub-microscopic crystallites per cu. mm. in the Pyroceram, each crystallite acting as a centre of crystal growth as the heat continues.

One of the most interesting features of Pyroceram is undoubtedly that instead of one outstanding or desirable property, it possesses a combination of desirable properties. Thus, it has high mechanical strength, up to 40,000 p.s.i., with up to 60,000 p.s.i. in certain experimental types. It also has excellent hardness—tests show that it is harder than fused silica, stainless steel, titanium and is no less than 27 times harder than plate glass. With these highly desirable properties there is no loss of electrical insulating properties or thermal shock resistance. Specific gravity of the end product is 2.40 to 2.62 and its strength to weight ratio is Pyroceram, No. 8605, 14.1, compared with 13.3 for dense alumina, 14.3 for aluminium, and 10.1 for stainless steel.

Softening temperature is up to 1,350°C. (2,460°F.), it is gas-tight and the final material is either white opaque or clear. Pyroceram, No. 8607 is stated to be nearly as resistant to acid attack as borosilicate glass and more resistant to alkali attack. Thermal expansion, it is claimed, can range from slightly negative to 200×10^{-7} per degree C. and at 0.010 c.g.s. units Pyroceram No. 8605 has four times the conductivity of borosilicate glass.

Out of 1,000 types of new material produced experimentally, four have been melted for pilot runs. One particular Pyroceram which has a softening point of 2,460°F. (above that of some stainless steels), is lighter than aluminium and has a flexural strength of 40,000 p.s.i. This Pyroceram has been used in radomes (nose cone for guided missiles). As certain types of the new material retain their strength at temperatures of the order of 1,300°F. and are at the same time light, with a high strength-to-weight ratio, Pyroceram is suggested as having potential use as a substitute for aircraft metals.

A most important characteristic of this new product is the ease with which it can be formed while in its glass state into a variety of shapes and sizes by all the known glass-forming techniques. It can be hand blown, for instance, or machine blown. Pans, low-walled cylinders and crucibles can all be produced by pressing and solid rod and tubing can be drawn in quantities. It is very probable that the material can be rolled or drawn into large sheets.

To demonstrate the thermal shock resistance of this glass-like material, dishes made from it can be heated to 1,300°F and then plunged into ice water with no untoward effect.

Suggested uses for Pyroceram include turbine blades, jet engine parts, and radomes, electrical cooker tops and cooking utensils.

Chemical Firm Appeals Against Council Decision

AN APPEAL against Woking Council's refusal to grant permission to continue to use premises in a zoned shopping area was made recently by Crack Pulverising Mills Ltd., Old Woking. The firm was said to be the only one in the world carrying out a secret chemical process which resulted in valuable exports to dollar countries. The appeal was heard by Mr. H. A. Campbell, for the Ministry of Housing and Local Government.

Mr. W. J. Richardson, Fire Prevention Officer, reported that inflammable liquids were used under conditions which indicated risks of fire and explosion. Mr. H. Griffiths, for the appellants, said that to move the plant would cost some £20,000 and would ruin the company. Soon after the firm started there had been complaints about the noise of a vacuum pump, but it was removed and no complaints had been received since.

The Minister's decision will be notified in due course.

Indian Customs Relaxation

The Indian Government has exempted from customs duty leaevo-l-p-nitrophenyl-2-amino-1:3 propanediol (known as 'L-Base') in excess of 25 per cent where the standard rate of duty is liable and 15 per cent where the preferential rate of duty is liable.

Overseas News

US ATOMIC ENERGY COMMISSION'S REPORT TO CONGRESS

IN its semi-annual report to Congress, the US Atomic Energy Commission indicates that US production of uranium oxide should be almost doubled by the end of next year. In the first half of this year output of relatively pure concentrate was 4,200 tons compared with 2,600 tons in 1956. By the end of 1958 it is expected that production will reach 14,000 tons a year.

Mention is made of the high uranium oxide content of US ore. This is stated to be twice as high as that of Canadian ore and even more in comparison with that of South Africa. However, no new uranium-producing areas have been discovered to date in the US. According to the Commission the US had reached the position where a 10-year supply of uranium was in sight.

Of its overall programmes, the AEC report that steady progress in the development of a variety of reactors and nuclear weapons for defence has been made. Efforts to produce economic nuclear power have also progressed.

A first shipment of radioactive isotopes has been sent to the USSR, the Commission's report discloses. These were for use by the Biochemical Institute of the Academy of Science in Moscow for cancer research. The company exporting this material was the Chemesco Corporation of New York. A small amount of radioactive carbon-14, to be used by the Soviet Scientific Institute, was also forwarded.

Radioisotopes are stated by the AEC to be contributing to the economy of the country by an annual saving of nearly $400 million (£140 million) in industrial uses alone, while the field to use isotopes was constantly being broadened.

Norway's New Carbide Plant

Production will start early next year at the new carbide plant of Norsk Hydro, Norway's largest industrial concern. The plant, which is to have an annual output capacity of about 30,000 tons, is under construction near Hydro's Eidanger Saltpeter Fabrikken in Eidanger, East Norway. The Hydro company will then be provided with all the carbide it requires as a basic raw material for its plastic production requirements.

Large Sulphur Deposit Found Near Rome

An extensive sulphur bed is reported at Pomezia, a small town about 18 miles south of Rome. The bed is said to be two miles long and slightly over half a mile wide. The sulphur lies about 65 ft. below the surface and can therefore be extracted by less costly American methods.

The company, Societa' Quirinia, which holds a concession for this area, has collected a large number of samples, and if the results are encouraging a factory for the production of sulphur and other chemicals will probably be built. Pomezia lies in the territory of the 'southern Italy fund' which supplies grants to help the industrialisation of the southern half of the country.

Desilication of Kaolinitic New Materials

Included in the current issue of *Hutnické Listy*, 1957, 7, 657, is the latest report of Czechoslovak metallurgical research. Subject of the report is production of aluminium oxide from kaolinitic raw materials by the desilication method, by Dr. Zdenek Svejda.

The method of desilication described is the annealing of the raw materials at 950 to 1,050°C., dissolving in silica dioxide in sodium hydroxide solution and treating the residue with the Bayer or combined methods. The caustic soda solution containing the dissolved silica dioxide is regenerated by means of calcium oxide and after separation of $CaSiO_3$ by filtration is ready for use again.

This new method has been tried on a pilot-plant scale.

Radioisotope Research in West Germany

The Isotopes Study Society, formed in early April by the German Federal Republic, regional authorities and private interests, has now decided to set up two special institutes at an initial cost of £130,000 to be spent in the next two years. The institutes will be situated at Karlsruhe and Düren and be headed by Professor Berthold and Dr. Sauerwein. Industrial firms, which are to provide one-third of the funds required, have so far subscribed £20,000.

New Journal of Ultrastructure Research

From the US comes news of a new publication—the *Journal of Ultrastructure Research*. It is to be edited by Dr. Fritiof S. Sjöstrand (editor-in-chief) and Dr. Arne Engström, both associated with the Karolinska Institutet, Stockholm. The editorial board will consist of F. B. Bang (US), W. Bernhard (France), A. Claude (Belgium), V. E. Cosslett (England), Albert J. Dalton (US), John Farrant (Australia), A. Frey-Wyssling (Switzerland), Alan J. Hodge (Australia), Daniel C. Pease (US), J. B. Le Poole (Holland), J. T. Randall (England), Ernst Ruska (Germany), W. J. Schmidt (Germany), Hugo Theorell (Sweden), Arne Tiselius (Sweden), R. W. G. Wyckoff (US). Publishers are Academic Press Inc., US.

Purpose of the journal is to assemble in one medium papers dealing with the ultrastructure of the elementary structural as well as functional components of cells and tissues. Papers on biological material analysed by means of electron microscopy, X-ray diffraction techniques, X-ray microscopy, polarisation optical analysis, and polarised infra-red analysis will be acceptable as will those describing techniques and instruments of importance for the development of ultrastructure research.

The first volume, priced at $15.00, will consist of four issues. Manuscripts and queries concerning the preparation of papers should be sent to the *Journal of Ultrastructure Research*, Department of Anatomy, Karolinska Institutet, Stockholm 60, Sweden.

Phosphate Expansion Planned for Christmas Island

Officials of the Phosphate Commission, recently returned from a periodical inspection of Christmas Island, stated in Australia last week that phosphate production at the island was expected to be more than doubled by 1961. This increased output will result from a new big expansion programme first announced in Australia.

Nitric Acid Prospects in US

According to the latest *Baird-facts* (August), nitric acid capacity in the US is increasing rapidly and is estimated to reach 3.7 million tons a year by 1958. Production this year is expected to be about 2.8 million tons—or 80 per cent of capacity. According to the report sales until recently have been slow but are now improving. Prices in western areas of the US have increased.

The greater part of nitric acid output (some 75 per cent) is used for fertiliser production. The growing demand for ammonium nitrate will, according to estimates, reach 2.8 million tons in 1960. Nitric acid for explosive manufacture is also increasing rapidly and it is believed that this acid will also become important in uranium metallurgy.

Increased Swiss Exports of Aniline Dyes

According to figures just released in Zurich, Swiss exports of chemicals in the first six months of this year were valued at 584.2 million francs, compared with 480.4 million francs in the same period of 1956. Particularly noteworthy were exports of aniline dyes which reached 155 million francs up to June this year. Aniline dye exports for the first six months of 1956 were 130.3 million francs.

US Potash Production up in 1956

Marketable potassium salts production in the US reached a new level in 1956 of more than 3.6 million short tons, according to reports by producers. Sales of potassium salts increased 4 per cent in 1956, while apparent consumption remained about the same compared with 1955. US imports of potash materials remained about the same

in 1956; exports were 73 per cent more than in 1955. West Germany, East Germany, France, Spain, and Chile continued to be the principal supplying countries. The major portion of exports went to Japan (49 per cent) and countries in the Western Hemisphere (41 per cent).

Molten Glass Lubricants for Forming Titanium Sheet

A series of new glass lubricants has been developed by the Seattle Division Processes Unit of the Boeing Airplane Company as a result of experiments with molten glass lubricants for forming titanium sheet at between 800 and 1,700°F. The glasses are in organic suspensions and are applied to the metal by means of dipping and spraying. The new materials not only act as lubricants but also protect the metal against corrosion and prevent galling.

It is claimed that these glass lubricants are removed fairly easily from parts and dyes. They have also been used successfully in both drawing and brake forming with heated parts and dies as well as for deep hammer forming with heated parts, and both hot and cold dies.

US Nuclear Fuel Gift to W. Germany

A surprise gift to Frankfurt University last month from the US was 1,800 grammes of uranyl sulphate. The US has maintained that it would only send nuclear fuel to those nations having atomic legislation. W. Germany has no law as yet regulating the use and treatment of nuclear fuel, although at the end of last month the W. German Cabinet approved the text of a Bill providing for construction of atomic reactors for research and development purposes.

German Equipment for Rumanian Fibre Plant

A £2 million order has been placed by the Rumanian Government with Hans J. Zimmer, consulting engineers, of Frankfurt, for the supply of equipment and technical advice in respect of Rumania's first fully synthetic fibre plant, now under construction.

This plant, situated north of Jassy, is estimated to cost £4 million. It is to have an annual output capacity of 2,000 tons of nylon six, half fibre and half filament. Operations are expected to start in the second half of 1958.

Zimmer was founded six years ago, and developed into Germany's leading consulting engineers in the synthetics fibres' field. The company employs 200 chemists and technologists.

Payment for the German equipment, etc., will be in limited convertible marks, the last instalment to be paid one year after the plant has been operating.

Du Pont's $7 Million Explosives Plant in Ontario

Newest explosive plant in Canada is that of Du Pont of Canada Ltd., which has just been officially opened. Situated at West Ferris, near North Bay, Ontario, the plant is composed of 30 production and service buildings occupying 50 acres and has cost $7 million. It is said to incorporate the latest technological advances in the industry. Process buildings are enclosed in mounds of earth and are described as resembling, from the air, high ant hills. They are the first of their type in Canada.

Initially 110 persons are employed, but this number is expected to increase with rising production. Many new manufacturing developments have been included, with considerable automatic equipment.

This plant is the second which Du Pont of Canada is bringing into production this summer. The other is the $8 million plant for the manufacture of Orlon acrylic fibre, which is at Maitland, Ontario. It is planned that output of this plant will meet Canadian requirements of this new fibre for some time to come.

New Production Schedules For Naphta-Chimie

Annual production by Naphta-Chimie, France, of ethylene (10,000 tons) and of propylene (10,000 tons) is to be increased 1·8 times. To enable this to be done, the cracker at the Martignes plant will cease to function for three months, during which period the modifications in the installations will be effected.

Shredded Polythene for Air Cleaner

Shredded polythene encased in a metal holder forms a self-charging electrostatic air cleaner. Shredding enables a large surface area to be presented to the air stream and to cause pronounced turbulence. The polythene generates an electrostatic charge which captures and holds dust, smoke and even pollen.

The filters are stated to withstand air temperatures up to 212°F. and are inert to chemicals normally encountered in industrial atmospheres. Such an electrostatic air cleaner is used to protect the Goodyear electronic differential analyser.

Preservatives for Glycerine Solutions

Data sheets on preservatives and fungicides for glycerine solutions are available from Chemo Puro Mfg. Corp., 150 Doremus Ave., Newark 5, NJ, US. They recommend Chemocide DHS (sodium dehydroacetate) for industrial or external use, and a combination of 0.07 per cent chemocide MK (methyl p-hydroxybenzoate) and 0.03 per cent chemocide PK (propyl p-hydroxybenzoate) for foods and internal medications.

Petro-Chemsol Report Trade Deficit

A net loss of $160,436 for the year ended 31 March 1957 has been reported by Petro-Chemsol Chemicals Ltd., Petrolia, Ontario, Canada, producers of benzene, toluene, xylene and solvent naphthas. Sales were $1,530,883 and the company's deficit amounts to $288,975.

The company is said to be handicapped by its location. Increasing freight charges must be absorbed to make the company's products competitive in certain consuming areas. This problem will be accentuated when new producers come on stream in the Sarnia area, the company state. Credit restrictions were a further drawback.

Negotiations have been completed with a US chemical concern for purchase of organic intermediates over a 10-year period, the value of the agreement being $70 million. This process is contingent upon the success of Petro-Chemsol's continuing negotiations for raw materials, licence agreement and financial arrangements.

Union Chimique Belge Open New Laboratories

The pharmaceutical division of Union Chimique Belge, the largest Belgian chemical enterprise, has opened three new modern laboratories—a biological research laboratory, an electro-physiological and a biochemical laboratory.

Belgium Plans Nuclear Reprocessing Plant

Unconfirmed reports in Brussels state that the Organisation for European Economic Co-operation is considering setting up a pilot nuclear reprocessing plant for used uranium fuel elements and that the site chosen might be Mol, the Belgian atomic energy centre.

US Stocks of High Grade Naphthalene up 30-Fold

US PRODUCTION of basic coal-chemical materials declined in 1956, but decreases were proportionate with the decline in coke production, as there were only minor changes in average yields. Ammonia decreased 7 per cent and crude tar 2 per cent. Two additional coke plants (making a total of three) started making diammonium phosphate in place of ammonium sulphate.

A decline in the production of phthalic anhydride greatly reduced demand for the higher grade of crude naphthalene (76° to 79°) and stocks of this material increased 30-fold by the end of 1956. Price cuts in ammonium sulphate reduced the average realisation per ton from $38 in 1955 to $32 in 1956.

Production of coke-oven ammonia in 1956 from 78 plants (79 in 1955) totalled in sulphate equivalent 1,949,604,164 lb. (against 2,091,596,851 lb.). Of this, 1,812,436,848 lb. (1,962,652,237 lb.) were produced as sulphate and 35.3 million lb. (33.2 million lb.) were produced as liquor (NH_3 content).

US production of crude naphthalene in 1956 was: solidifying under 74°C., 34.4 million lb. (38.1 million), from 74° to 79°C., 142.7 million lb. (146 million).

Production of light-oil derivatives in 1956 was: benzene (all grades except motor), 174.4 million gals. (174.2 million); toluene 37.2 million gals. (38.2 million); xylene, 10.3 million gals. (11.2 million); solvent naphtha 5.8 million gals. (5.5 million).

EQUIPMENT REVIEW

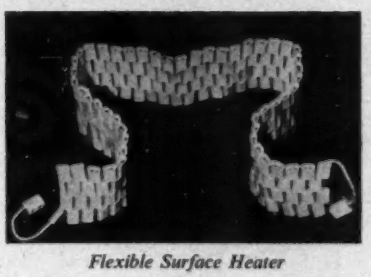
Chemical Plant: Laboratory Apparatus Safety and Anti-Corrosion Products

AUTOMATIC MICRO BALANCE THE micro balance, type 180, manufactured by Sauter and available from Shandon Scientific Co. Ltd., 6 Cromwell Place, London SW7, is said to represent a new conception in rapid and accurate weighing. The circular scale is fully rotating and is marked through its 360° with 500 divisions each of 1 mm. width.

As the beam is suspended by a patented system of quadrants there is no bearing friction. Pre-loading is not necessary as the balance adopts a position of equilibrium immediately on release. Instantaneous damping is achieved through a friction-free sealed dash pot. Special alloys have been used in the construction to overcome changes caused by temperature variations and magnetic forces.

Readings are taken at one central position and it is claimed that an anti-parallax mirror eliminates reading errors. Eleven models are available to cover ranges from 0–1 mg. to 0–12.5 g. To facilitate identification, a simple colour code has been incorporated in the control knob.

FLEXIBLE SURFACE HEATER A FLEXIBLE surface heater has been produced for temperatures of up to 1,000°C., by Electrothermal Engineering Ltd., 270 Neville Road E17. Known as the flexible furnace, it is intended for pre-heating and stress relieving for welding, annealing processes, high temperature testing of structures, shell moulding, and the heating of pipe lines, vessels, and chemical and industrial plant.



Flexible Surface Heater

The heater is built up from a network of resistance wires insulated by interlocking high temperature resistant ceramic blocks. Designed to have a surface loading of up to 50 p.s.i., the basic unit, the high temperature resistant ceramic block, is $\frac{5}{16}$ in. by $\frac{3}{4}$ in. by $\frac{3}{4}$ in. and functions independently of, but attached to, its adjacent numbers.

It is made to specification in sizes up to 48 × 48 in., and where the surface to be heated is greater, two or more can be linked together.

CANTILEVER SHELVING SYSTEM A NEW and economical shelving system is being introduced by Savage and Parsons Ltd., Watford. The basis of the Spur system is removable cantilever shelf brackets supported in slots on a fitted vertical upright which is screwed to a wall, or on a double-sided upright fixed to floor and ceiling. For situations where appearance is of importance, the rust-protected steel components are supplied stove-enamelled in grey, white, terra-cotta or black but alternative colours are available to special order. For purely utilitarian purposes, or where excessively damp or corrosive atmospheres are likely to be encountered, the components can be nickel- or chrome-plated or zinc sprayed and galvanised.

The cost of the components varies according to the size but as an example a 39-inch length of wall upright would cost 9s 1d; 7-inch bracket, either right-angle or slanting, costs 3s, and an 80-inch length of double-sided upright costs 67s 6d.

WOBBE INDEX RECORDER A RECORDER of Wobbe index has been produced by Sigma Ltd., Letchworth. Wobbe index is the rate of thermal delivery of a gas, and can be expressed as the square root of the specific gravity divided by the calorific value. The recording mechanism of the Sigma machine is actuated by the heat from the gas which passes along a flexible tube to the burner situated in the bottom of a steel tube through which the products of combustion are vented to atmosphere.

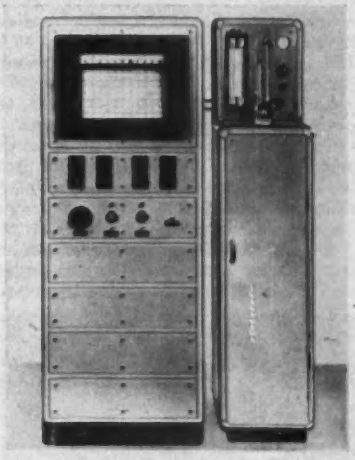
The tube is surrounded by a second steel tube, concentrically mounted, and the two tubes are connected together at their lower ends. The differential expansion of the two tubes is found to be in direct relation to the thermal input of the gas being burned. If the temperature of the room changes, both tubes respond to an equal extent.

FILTER-SEPARATOR UNIT A BULK fuel filter-separator has been produced by the Purolator filter division of Automotive Products Ltd., Leamington Spa. A range of models suitable for flow rates from 250–750 g.p.m. will be available for aircraft refuelling installations, diesel fuel storage depots, engine test houses and other places where fuel is handled. The unit is intended to extract solid particles as well as water from the fuel.

BULKHEAD LIGHTING UNITS HEYES AND CO. LTD., of Wigan, have introduced new bulkhead lighting units which will be known as the Duolacent range. These fittings incorporate both concave and convex surfaces in one glass cover, but with internal prisms only, resulting in better light dispersion from a given wattage and very much easier cleaning. At present, the unit is made in one size to accommodate up to 100-watt G.L.S. lamps, but this can be supplied with bases in cast iron, cast aluminium, cast brass or porcelain. The use of porcelain will be an advantage in the chemical industry in view of its resistance to corrosion.

FLAME CHROMATOGRAPH THE SHANDON flame chromatograph for gas chromatography, introduced by the Shandon Scientific Co. Ltd., 6 Cromwell Place, London SW7, is based on the apparatus developed by the National Benzole Co. Ltd. (now Benzole Producers Ltd). It is said to be the only commercially available apparatus where detection is achieved by the simple method of burning the exit gases at the end of the chromatographic column in a micro-flame and continuously monitoring its temperature.

This instrument has been designed on the unit principle to make the equipment as flexible as possible and capable of dealing with a great variety of work. Up to four analysers can be operated from the central recorder unit. The flame chromatograph has a wide range of applications covering, it is stated, all samples that can be volatised and are stable in their vapour state. Special applications include the study of reaction kinetics, determination of purity of chemicals, characterisation of distillation cuts, plant stream analysis, and comparison of complex mixtures for screening purposes.



Flame Chromatograph

The carrier gas, a mixture of hydrogen and nitrogen, is regulated and passed via a capillary flowmeter into the chromatographic column. The sample is introduced at the head of this column which consists of an interchangeable U-shaped metal tube. The column is in a thermally insulated jacket and kept at a constant temperature by vapour of a liquid at the required boiling point. At the exit, the column is coupled to a fine jet situated below the thermocouple. The flame burns steadily in a special combustion chamber, its

temperature varying only when a component is eluted from the column.

The sample is dispensed onto the column material through the sampling chamber by a magnetically controlled pipette.

DIFFERENTIAL PRESSURE TRANSDUCER

THE DIFFERENTIAL pressure transducer type ER125, produced by Evershed and Vignoles, Acton Lane, Chiswick, London W4, converts differential pressures into an electric direct current signal suitable for remote indication, or as the measured value signal for an Evershed electronic process controller. This transducer's output may also be employed as one of the input variables for the Evershed simple analogue computor.

The transducer is suitable for application to processes involving oil, viscous or corrosive fluids as well as water, steam or gases. It is designed to operate over protracted periods with the minimum of maintenance and constructed to withstand severe operating and climatic conditions. Maximum temperature rating is 177°C.

The continuously adjustable ranges covered are 0–5 w.g., 0–50 w.g. and 0–200 w.g. Maximum working pressures are up to 1,000 p.s.i. Accuracy ± 1 per cent of FSD. The output signal can be arranged as either 0–15 mA or 0–30 mA.

RUBPROOFNESS TESTER FOR PRINTERS

OF INTEREST to print trade laboratories is a production version of the print rubproofness tester, developed by the Printing, Packaging and Allied Trades Research Association. A report of three years' work with the prototype machine, with which uniform rubbing conditions can be produced, may be obtained by members of PATRA, from PATRA House, Randalls Road, Leatherhead, Surrey.

The apparatus enables prints to be rubbed in a standard manner against a variety of surfaces and meets the needs of printers who require a test to check that their prints will be adequately rubproof. One application is in the testing of cartons where considerable handling occurs.

In use, the sample under examination is cut to size with a template and placed between the instrument's two rotating discs.

PATRA Rub Tester

The lower disc holds a piece of white card and as the upper disc is lowered the two surfaces are brought into contact. The number of rubs are recorded on a counter. Different intensities of rubbing can be produced by varying the weights acting upon the upper disc.

THERMOSTATIC HEATING OF JACKETED VESSELS

A VALVE for thermostatically controlling hot water or steam at a pre-determined temperature is being produced by Walker, Crosweller Ltd., Cheltenham. Known as the Leonard valve, and intended for jacket

Leonard thermostatic steam water heater

heating and cooling, its mechanism is effected by a bimetallic coil thermostat situated in the mixing chamber. A rise in the hot water (or steam) pressure increases the hot water supply (or steam) entering the mixing valve, thus raising the temperature. The thermostat immediately responds to this change, moving a sleeve so that the position of the port openings is varied and less hot water (or steam) admitted. A similar action compensates for changes in the cold water pressure. In this way the pre-selected temperature of the blended water is restored and kept steady. If either supply fails the thermostat closes against the other supply. The valve has only one moving part, the port sleeve.

SMALL BATCH INFRA-RED OVEN

SPECIALLY designed for removal of moisture from chemicals, curing and softening plastics and the drying and activation of adhesives is an infra-red oven, type IRO/2, made by Metropolitan-Vickers Electrical Ltd., Trafford Park, Manchester 17. It consists of a sheet steel casing using infra-red tubular sheathed heating elements in trough-shaped anodised aluminium reflectors in the top of the oven which heat the material on a shelf by direct radiation. To conserve any stray radiant heat, the sides and floor of the oven are also lined with aluminium sheet. The exterior finish is in two-tone grey stoved enamel.

Ventilation of the oven is effected through louvres in the top cover into the surrounding atmosphere, with air intake vents in the base raised clear of the bench by means of small feet. Shelf guides are fitted at three heights to suit different applications. Additional items available include an asbestos tray, wire mesh tray, hinged front door, floor mounting stand, energy regulator control box. The asbestos tray is recommended for softening plastic sheets where a heated support is desirable and the wire mesh tray for small metal articles etc.

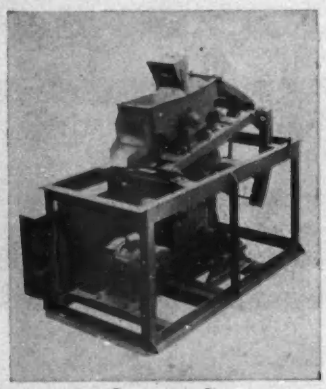
For certain applications needing lengthy heating cycles there is a hinged front door, lined with an aluminium reflector. For lower intensities of radiant heat and for infinitely variable fine control, a Sunvic energy regulator scaled 01100 can be provided. This control is arranged for separate mounting and incorporates a type ERL energy regulator, a 30-amp special contactor, red and white indicator lamps all mounted in a sheet steel box. Price of the bench mounting oven is £50.

SEPARATION OF WASTE MATERIAL

A PNEUMATIC jig, now being produced by Knapp and Bates Ltd. of 117 Africa House, Kingsway, London WC2, is intended for the separation of coarse material in the dry state, such as in the recovery of metallic fragments from industrial wastes, the grading of light and heavy peas or the scalping of impurities in chemical manufacture.

The operating principle is that an air 'cushion' is created above a vibrating, inclined plate. Due to specific gravity differences in material being treated, light particles, being more easily airborne, are carried down the plate and heavy particles ride up the plate, due to their more frequent contact with the vibratory motion.

In construction, the machine consists of a sloping trough, coupled to a windbox which receives air from a fan. The air emerges from the windbox through a porous, sintered phosphor bronze plate which forms the trough bed. Vibration of the trough is effected by a high speed, low amplitude eccentric, this motion being adjustable by varying the speed of the eccentric and by adjusting four toggles which



Pneumatic Jig

hold the trough in position. A control for the fan motor is included to provide regulation of the air volume passing through the sintered plate.

In operation, a hopper feeds material to the trough, a variable hopper aperture and a vibrating feeder being fitted to ensure even rate of feed. As the particles fall on to the porous plate, they are affected by the current of uprising air and the vibratory motion of the trough, a 'pool' of heavy material forming behind a weir at the lower end. As soon as this pool has been formed, further heavy material is carried up the slope of the trough, whilst lighter material rides over the pool to be discharged at the lower end.

Capacities of the jigs vary according to the type of material being treated and for the three units now being produced lie between 100–200 lb./hr., 500–800 lb./hr. and 1,000–1,500 lb./hr.

CHEMICAL PIONEERS

9 Peter Spence

Peter Spence, whose life is described in this article, the ninth in the series, by Dr. D. W. F. Hardie, developed the production of many basic chemicals and founded one of the leading companies in this field. In the course of his career he was granted 56 patents, most of which were concerned with the manufacture of alum and aluminium sulphate.

PETER SPENCE was born on 19 February 1806 in the small linen-weaving town of Brechin in Angus, Scotland. His maternal ancestors had been farmers in the surrounding strathland for generations and his father plied the common trade of the town—hand-loom weaving. Young Spence was brought up in an atmosphere of 'auld licht' piety and industriousness; what formal education he had was given him at the local school. In his early 'teens he was apprenticed to a grocer in Perth.

In the evenings he studied science. There were no classes which he could attend to give his scientific studies stimulus and system. His reading in chemistry could, at that time, have had no other aim than the satisfaction of intellectual curiosity; there is no evidence that he envisaged any change in his future which would involve its application. His apprenticeship completed, he joined his younger brother James and an uncle, Mr. Sime, in a new grocery business.

Grocery Venture

In 1831 Peter Spence married his first wife, Agnes Mudie, the daughter of a Dundee linen manufacturer. The grocery business was not prosperous and Mrs. Spence, to augment the household income, ran a coffee-room. Fortunately, as it turned out, for both Peter and his brother, the business in Perth had to be abandoned. James Spence sought a new career in the naval dockyards and ultimately became a successful naval architect and consulting engineer. Peter went to live with his wife's family in Dundee, where he obtained work at the gasworks.

In the tiny wash-house at his parents-in-laws' home he experimented with various byproducts from the gasworks, particularly with the cyanides from the gas purification process. By 1834 he considered himself sufficiently equipped with practical knowledge and experience to embark upon chemical manufacture on his own account in London.

It is fairly certain that Spence's principal chemical activity in London was the manufacture of prussian blue, potassium prussiate, and plaster of Paris from waste solid lime and lime liquor from gasworks. His first patent, dated 27 July 1836, dealt with a number of procedures for utilising gasworks spent lime for that purpose. Although for six years Spence continued in chemical manufacture in London, he was not financially successful. In 1840 he migrated to Burgh-by-Sands, near Carlisle, where he took charge of a small chemical works.

For seven years Spence laboured in obscurity at his remote Cumberland factory. His efforts were directed towards developing a new process for the production of alum from waste coal-shale. Up till this period alum had been obtained by burning the shale in great mounds, whereby a complex series of changes took place, pyritic sulphide becoming oxidised and reacting with the alumina also present in the shale. The resultant aluminium sulphate was extracted from the calcined shale with water, and alum produced by crystallising the solution in presence of potassium chloride. The potassium chloride used was obtained as a very impure byproduct of the glass industry or from soap manufacture; urine was used as the source of ammonia for making ammonium alum.

Employing this traditional process, 100 tons of shale yielded some 3 tons of commercial alum. Large quantities of fuel were consumed in concentrating the weak extract liquor to the point of crystallisation.

Calcined Shale Extraction

Spence experimented on the extraction of calcined shale with sulphuric acid. His first patent for acid extraction was granted in November 1845; his second patent, dated 12 November 1850, protected his fully-developed process, the principal features of which were acid extraction of the burnt shale to the point at which the solution crystallised without concentration by evaporation, and the use of gasworks ammonia to produce ammonium alum from the acid extract liquor. These inventive steps, simple though they were, laid the foundation of a revolution in one of the oldest and most conservative branches of chemical manufacture.

In 1847, Spence, confident that he was in possession of the technical basis of a new and profitable enterprise, left Cumberland and, with a partner, Henry Dixon, set up works at Pendleton, Manchester, where he was close to sources of raw material and to the principal market for alum. He was not disappointed in his expectations. During the first few years of Spence's operations at Pendleton the alum works in Scotland, using the old method of manufacture, continued to exceed his annual output and to surpass his alum in quality, but as the decade advanced the advantages of the new process became decisive.

By 1860 Spence was the largest manufacturer of alum in the country and the quality of his product had been greatly improved. In 1855 he set up factories at Birmingham and Goole; at the latter he drew on the South Yorkshire coalfield for shale and on the gasworks of Hull, York, Wakefield and Bradford for ammonia. In 1854–5 he began to carry out experiments on the production of pure aluminium sulphate from Cornish granite rock, and in October 1855 he was granted a patent for a process in this connection.

Spence's long-delayed success in industry was not without its reverses. In 1857 a number of important residents in Pendlebury brought charges that his works constituted a public nuisance and a danger to health. Although it was not proved that injury had been caused, the verdict went against Spence on one of the counts. He had to move his works to a new site at Miles Platting.

When, in 1870, large deposits of aluminium phosphate were found in the West Indian Island of Redonda, Spence conceived the possibility of using this raw material for the co-production of aluminium sulphate and calcium phosphate fertiliser. After several years of experimenting Spence made extensive modifications of his works to operate the new process. On the large scale it proved a complete failure, and only the generosity of a fellow church-deacon saved Spence from financial disaster. Two years later Spence had repaid his benefactor and become the largest producer of alum in the world. By 1882 Spence's annual output considerably exceeded 10,000 tons, of which the greater part consisted of various grades of aluminium sulphate.

In the course of his industrial career Peter Spence was granted 56 patents. While most of his patents were concerned directly or indirectly with the manufacture of alum and aluminium sulphate, Spence made considerable inventive excursions into the field of copper metallurgy, and into methods of dealing with smoke and sewage. His method of purifying water by treatment with aluminium sulphate was first tried out at Bolton waterworks; it proved to be entirely successful and was estimated to cost about one half-penny a year per head of population. In 1882 Spence was granted his last patent. This protected the process for freeing aluminium sulphate solutions from iron by addition of manganese dioxide; it became the occasion of a law-suit between the firms of Kurtz of St. Helens and Spence and Sons.

In Manchester Spence became a notable figure. He took an active part in the proceedings of the Literary and Philosophical Society and was an influential propagandist for the Manchester Ship Canal project.

He died 7 July 1883 at Erlington House, Seymour Grove, Old Trafford. Despite his great and fundamental contribution to a key chemical industry, he did not amass wealth; his personal estate amounted to less than £16,000.

Courses Approved for Diploma in Technology

Asked to make a statement on the progress made by the designated colleges of advanced technology as regards their new activities last week, Sir Edward Boyle, Parliamentary Secretary to the Ministry of Education, said that courses approved for the Diploma in Technology included the following:

Battersea: Applied chemistry, chemical engineering, metallurgy.

Birmingham: Applied chemistry, applied physics, chemical technology, metallurgy.

Northampton (London) Polytechnic: Applied physics.

Sulphuric Acid Returns for Second Quarter 1957

CONSUMPTION of sulphuric acid in the period 1 April to 30 June shows an increase of 23,634 tons of 100 per cent H_2SO_4 compared with the corresponding period last year. Figure for the 1956 period was 582,565 tons.

A detailed comparison with last year's figures shows that the pattern of consumption has changed very little in the past 12 months. Largest trade uses are superphosphates (120,416 tons), sulphate of ammonia (76,736 tons), rayon and transparent paper (76,387 tons) and titanium dioxide (74,571 tons).

The three-monthly returns, published by the National Sulphuric Acid Corporation Ltd., are summarised below.

SULPHURIC ACID AND OLEUM

(Tons of 100% H_2SO_4)

	Chamber and tower only	Contact only	Chamber, tower and contact
Stock, 1 April	23,908	68,152	92,060
Production ...	138,065	448,693	586,758
Receipts ...	3,881	69,880	73,761
Oleum feed ...	—	1,078	1,078
Adjustments	—374	+427	+53
Use	91,691	240,243	331,934
Despatches ...	47,230	268,444	315,674
Stock, 30 June	26,559	79,543	106,102
Total capacity represented	179,820	518,880	698,700
Percentage production ...	76.8	86.5	84.0

CONSUMPTION

(1 April to 30 June)

Trade uses	Tons 100% H_2SO_4 1956	1957
Accumulators	2,590	2,584
Agricultural purposes	732	690
Bromine	2,577	3,199
Clays (fuller's earth, etc.)	2,448	2,538
Copper pickling	751	739
Dealers	3,198	2,988
Dichromate and chromic acid ...	4,669	5,126
Drugs and fine chemicals	4,289	4,523
Dyestuffs and intermediates ...	19,056	23,726
Explosives	4,981	4,129
Export	1,006	850
Glue, gelatine and size	119	111
Hydrochloric acid	15,451	14,818
Hydrofluoric acid	2,858	2,896
Iron pickling (inc. tin plate) ...	29,847	31,343
Leather	1,134	1,464
Lithopone	4,153	3,891
Metal extraction	999	869
Oil refining and petroleum products	15,704	15,427
Oils (vegetable)	2,174	1,975
Paper, etc.	1,670	1,436
Phosphates (industrial)	145	148
Plastics, not otherwise classified ...	10,595	9,434
Rayon and transparent paper ...	64,815	76,387
Sewage	2,690	2,806
Soap, glycerine and detergents ...	19,168	22,320
Sugar refining	154	131
Sulphate of ammonia	73,306	76,736
Sulphates of copper, nickel, etc. ...	6,589	7,092
Sulphate of magnesium	251	331
Superphosphates	132,680	120,416
Tar and benzole	5,940	7,195
Textile uses	4,746	4,291
Titanium dioxide	67,995	74,571
Unclassified	49,451	55,385
Total	558,931	582,565

Note.—These summaries exclude all Government plants.

RAW MATERIALS

(Tons)

	Pyrites	Spent oxide	Sulphur: Imported	Sulphur: Recovered, H_2S and filter cake	Zinc concentrates	Anhydrite
Stock, 1 April 1957	212,206	123,234	73,357	9,072	66,674	10,398
Receipts	91,577	64,899	78,046	10,486	41,790	183,938
Adjustments	+552	—1,362	—180	+1	+165	—
Use	92,176	68,389	75,357	9,101	37,773	176,277
Despatches *	3,049	2,042	1,868	23	—	—
Stock, 30 June	209,110	116,340	73,998	10,435	70,856	18,059

*Including uses for purposes other than sulphuric acid manufacture.

Process for Ultra-pure Silicon

A new process for the manufacture of ultra-pure silicon for electronic applications was described in a paper given by Dr. Robert S. Aries, of Aries Laboratories, Inc., New York, at the 16th International Congress of Pure and Applied Chemistry in Paris. Dr. Aries indicated that the process gives rise to silicon with boron impurities as low as two parts per billion and electrical resistivities as high as 400 and 500 ohm cm.

The process consists of reducing silicon tetrachloride with sodium. The tetrachloride is made from a metallurgical grade ferrosilicon, which is abundantly available.

It is stated that there should be thorough chemical purification of the raw materials, followed by a reduction at high temperatures in a continuous reactor. Other reducing agents such as potassium, lithium or mercury can also be used. The product is then 'grown' into crystals of about 100 grammes each, which in turn are sliced into waffles usable in electronic devices, such as transistors, rectifiers and diodes.

Commenting on the economic implications of the new process, Dr. Aries predicted that the price of transistor grade silicon should fall to below $150 per lb. by 1960 and well below $100 per lb. five years later. While many companies all over the world are now considering ultra-pure silicon, only the lowest cost producers with the proper product will survive, according to Dr. Aries.

Demand for ultra-pure silicon will be strong. According to Dr. Aries, the US consumption was 10,000 lb. in 1956; estimated 20,000 lb. in 1957 and a projected 90,000 lb. in 1960. This is due to the annual doubling of the semi-conductor business, which is expected to continue doubling for 5 to 7 years with a tapered-off growth thereafter.

SLTC Annual Meeting to be Held at Leeds

ANNUAL CONFERENCE of the Society of Leather Trades' Chemists will be held in the large chemistry lecture theatre, The University, Leeds, on 27 and 28 September. This is the 60th anniversary of the founding of the International Association of Leather Trades' Chemists and to mark the occasion the 60th anniversary lecture will be given by K. B. Ross, director of operations, Industrial Group, UK Atomic Energy Authority, who will take as his subject 'Some reflections on the atomic energy industry'.

Programme for the meeting is as follows: *Friday*, 27 *September*, 9.30 a.m. 'Some considerations on the nature of resins tannages' by W. S. Short and G. A. Mittler, The Yorkshire Dyeware and Chemical Co. Ltd. 10.20 a.m. 'Studies on the criteria of tannage' by J. P. Danby, National Leathersellers' College'. 11.30 a.m. 'An approach to the study of vegetable tannins by the oxidation of plant phenolics' by D. E. Hathway, British Leather Manufacturers' Research Association. 2.00 p.m. 60th anniversary lecture. 3.30 p.m. Business meeting of the SLTC.

Saturday, 28 *September*, 9.30 a.m. 'The relationship between grain strength of chrome retan leather and type and quantity of fat liquor' by Dominic Meo, Salem Oil and Grease Co. 10.30 a.m. 'Shell cordovan and analogies with combination tanned sole leather' by W. Frankford and A. Finch, Booth Research Laboratories.

Changes in Australian Import Licensing

TO STREAMLINE their import licensing controls, the Australian Government has brought 56 more commodities under the sales replacement principle. Under this system, importers receive licences on the basis of their selling ability and can obtain supplies from the most competitive source.

Among the 56 commodities are: scientific instruments; synthetic oils; bronzing and metal powders; titanium dioxide; nitrate of soda; rock phosphate manures; dyes; whiting and Paris white; ultramarine blue powder; and acrylic sheet.

Among new items to be licensed on a world basis purchasing list are: chemicals and other raw materials for use in the manufacture of sensitised material and processing chemicals for X-ray and photographic industries; boric acid; bacteriological products; rosin; Orlon and other synthetics; and bentonite.

Items for which import quotas have been increased include: sulphur chloride and carbon tetrachloride; litmus paper and filter paper.

City and Guilds Revised Syllabus

The City and Guilds of London Institute have revised the syllabus for the chemical plant operation scheme. Special chemical technology section D has been divided into two parts, fine chemicals and pharmaceuticals and minor amendments have been made to the petroleum chemicals and chemical fertilisers sections. The first examination on the revised syllabuses will be held in 1958.

PEOPLE in the news

● MR. J. C. HUTTON-WILSON has been elected chairman of the board of British Chrome and Chemicals (Holdings), Ltd., of Eaglescliffe (Co. Durham) following the death of Mr. E. F. Wright. MR. A. D. J. BURNINGHAM, deputy managing director, has been appointed managing director.

● DR. E. J. MILLER, who gave a paper on the practice in Great Britain in regard to pesticide residues in foodstuffs at the conference on control of chemical additives in food, has been chief of the plant pathology laboratory of the Ministry of Agriculture, Food and Fisheries since 1954 and is now concerned with the safe use of pesticides in agriculture. Dr. Miller graduated in biology and chemistry (B.Sc. Hons.) in 1936 at Kings' College, London University. He obtained his Ph.D. in biochemistry in 1939. During the war, he served in the Royal Engineers in the chemical warfare intelligence service, mainly in India, where he first worked with modern pesticides (DDT and BHC).

After the war he joined Government service and took up his present post following a few years with the Ministry's infestation control division.

● DR. W. E. HANFORD, vice-president and director of M. W. Kellogg Co., has been appointed assistant to the president for research at Olin Mathieson Chemical Corporation.

Prior to joining M. W. Kellogg Company, Dr. Hanford was director of research of General Aniline and Film Corporation. He joined General Aniline in 1942, after seven years as research chemist and research group leader with E.I. du Pont de Nemours. Dr. Hanford holds more than 100 patents in the United States and abroad and has made important contributions to the development of nylon, polythene, polyester, elastomers and acetylene chemistry. He also was a leader in the development of the chemistry of fluorocarbons.

● DR. C. N. SMYTH and MR. F. Y. POYNTON, working at the Northampton Polytechnic, London, have received a grant of £2,600 from the Paul Instrument Fund Committee, for continuation of the construction of an ultrasonic microscope for which a grant was made in December 1954. DR. E. T. HALL, senior research officer at the Research Laboratory for Archaeology and the History of Art, Oxford, has received a grant for £2,075 for the construction of an apparatus with which magnetic measurements may be made and for the development of an instrument for applying the method of neutron activation analysis to archaeological problems. Represented on the committee that made the grants are the Royal Society, Physical Society, Institute of Physics and Institution of Electrical Engineers.

● The Texas Company, of New York, US, have appointed MR. L. C. KEMP vice-president in charge of Texaco's petrochemical department. Mr. Kemp, who joined the Texas Company in 1929, was previously general manager of the department.

● MR. P. W. FAULKNER, general manager of the chemical and metallurgical division, Towcester, Northants, of the Plessey Co. has been appointed an executive director.

● MR. W. MORGAN THOMPSON has resigned as sales director of Monsanto Chemicals Ltd., to become chief executive of the Miles Companies. He has been appointed managing director of Miles Laboratories Ltd., 41 Piccadilly, London W1, and chairman of the subsidiary companies, Ames Ltd. and Don S. Momand Ltd. He succeeds MR. DON S. MOMAND who retired last week as managing director but who continues as chairman of Miles Laboratories.

Mr. Morgan Thompson

● DR. A. F. H. WARD, senior lecturer in physical chemistry at the Manchester College of Science and Technology, has been appointed by the Home Office as one of the three scientific advisers on civil defence in the north-west.

● Chief chemist of the Southern Rhodesia Metallurgical Laboratory, MR. BERNARD WITKIN, leaves shortly for the US, under the auspices of the International Co-operative Administration, for a six months' study of the latest process for the extracting of minerals from ores. In a joint statement issued by the office of the American Consul General and the Minister of the Treasury and Mines, MR. C. J. HATTY said that it was recognised that the US had made tremendous strides in this field, and has a vast amount of experience to offer to a country such as Southern Rhodesia. Mr. Witkin graduated in analytical chemistry in 1945 at Cape Town University. In 1952 he was appointed as metallurgical chemist in the Southern Rhodesia Government's Metallurgical Laboratory.

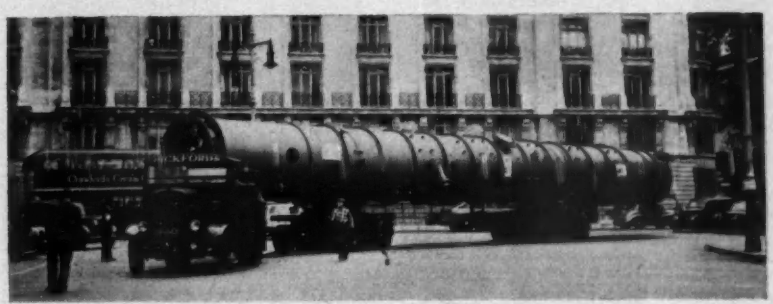
● DR. R. F. CURTIS has been appointed lecturer in chemistry at the University of Swansea for the 1957–58 session.

● CAPTAIN F. G. WAYMAN, referred to on p. 212, chairman and managing director of Rocol Ltd., Swillington, Leeds, and MR. G. J. VINEALL, director of research, have left Britain on the *Queen Elizabeth* on a sales tour of the principal engineering cities of the US.

New Uranium Plant

A new and larger uranium plant is now being built at Springfields, near Preston, alongside the existing factory that has been in production for the Atomic Energy Authority since 1946. The new plant will use more continuous processes to cope with the increasing nuclear power programme and magnesium instead of calcium reduction will be employed in the process.

Ninety-ft. vacuum column en route for Berry Wiggins refinery



Designed by Head Wrightson Processes Ltd. for erection at the Waste refinery of Berry Wiggins, this 26-ton steel vacuum column is shown approaching Marble Arch, London, on its way from the manufacturers, G. A. Harvey. Intended for second stage production of crude oil, this 90-ft. column will manufacture gas oils, lubricating oils and a wide range of bitumens. It has special chrome alloy steel internal cladding for corrosion protection

Sulphuric Acid Returns for Second Quarter 1957

CONSUMPTION of sulphuric acid in the period 1 April to 30 June shows an increase of 23,634 tons of 100 per cent H_2SO_4 compared with the corresponding period last year. Figure for the 1956 period was 582,565 tons.

A detailed comparison with last year's figures shows that the pattern of consumption has changed very little in the past 12 months. Largest trade uses are superphosphates (120,416 tons), sulphate of ammonia (76,736 tons), rayon and transparent paper (76,387 tons) and titanium dioxide (74,571 tons).

The three-monthly returns, published by the National Sulphuric Acid Corporation Ltd., are summarised below.

SULPHURIC ACID AND OLEUM

(Tons of 100% H_2SO_4)

	Chamber and tower only	Contact only	Chamber, tower and contact
Stock, 1 April	23,908	68,152	92,060
Production ...	138,065	448,693	586,758
Receipts ...	3,881	69,880	73,761
Oleum feed ...	—	1,078	1,078
Adjustments	—374	+427	+53
Use	91,691	240,243	331,934
Despatches ...	47,230	268,444	315,674
Stock, 30 June	26,559	79,543	106,102
Total capacity represented	179,820	518,880	698,700
Percentage production ...	76.8	86.5	84.0

CONSUMPTION

(1 April to 30 June)

Trade uses	Tons 100% H_2SO_4 1956	1957
Accumulators	2,590	2,584
Agricultural purposes	732	690
Bromine	2,577	3,199
Clays (fuller's earth, etc.)	2,448	2,538
Copper pickling	751	739
Dealers	3,198	2,988
Dichromate and chromic acid ...	4,669	5,126
Drugs and fine chemicals	4,289	4,523
Dyestuffs and intermediates ...	19,056	23,726
Explosives	4,981	4,129
Export	1,006	850
Glue, gelatine and size	119	111
Hydrochloric acid	15,451	14,818
Hydrofluoric acid	2,858	2,896
Iron pickling (inc. tin plate) ...	29,847	31,343
Leather	1,134	1,464
Lithopone	4,153	3,891
Metal extraction	999	869
Oil refining and petroleum products	15,704	15,427
Oils (vegetable)	2,174	1,975
Paper, etc.	1,670	1,436
Phosphates (industrial)	145	148
Plastics, not otherwise classified ...	10,595	9,434
Rayon and transparent paper ...	64,815	76,387
Sewage	2,690	2,806
Soap, glycerine and detergents ...	19,168	22,320
Sugar refining	154	131
Sulphate of ammonia	73,306	76,736
Sulphates of copper, nickel, etc. ...	6,589	7,092
Sulphate of magnesium	251	331
Superphosphates	132,680	120,416
Tar and benzole	5,940	7,195
Textile uses	4,746	4,291
Titanium dioxide	67,995	74,571
Unclassified	49,451	55,385
Total	558,931	582,565

Note.—These summaries exclude all Government plants.

RAW MATERIALS

(Tons)

	Pyrites	Spent oxide	Sulphur: Imported	Sulphur: Recovered, H_2S and filter cake	Zinc concentrates	Anhydrite
Stock, 1 April 1957	212,206	123,234	73,357	9,072	66,674	10,398
Receipts	91,577	64,899	78,046	10,486	41,790	183,938
Adjustments	+552	—1,362	—180	+1	+165	—
Use	92,176	68,389	75,357	9,101	37,773	176,277
Despatches *	3,049	2,042	1,868	23	—	—
Stock, 30 June	209,110	116,340	73,998	10,435	70,856	18,059

*Including uses for purposes other than sulphuric acid manufacture.

Process for Ultra-pure Silicon

A new process for the manufacture of ultra-pure silicon for electronic applications was described in a paper given by Dr. Robert S. Aries, of Aries Laboratories, Inc., New York, at the 16th International Congress of Pure and Applied Chemistry in Paris. Dr. Aries indicated that the process gives rise to silicon with boron impurities as low as two parts per billion and electrical resistivities as high as 400 and 500 ohm cm.

The process consists of reducing silicon tetrachloride with sodium. The tetrachloride is made from a metallurgical grade ferrosilicon, which is abundantly available.

It is stated that there should be thorough chemical purification of the raw materials, followed by a reduction at high temperatures in a continuous reactor. Other reducing agents such as potassium, lithium or mercury can also be used. The product is then 'grown' into crystals of about 100 grammes each, which in turn are sliced into waffles usable in electronic devices, such as transistors, rectifiers and diodes.

Commenting on the economic implications of the new process, Dr. Aries predicted that the price of transistor grade silicon should fall to below $150 per lb. by 1960 and well below $100 per lb. five years later. While many companies all over the world are now considering ultra-pure silicon, only the lowest cost producers with the proper product will survive, according to Dr. Aries.

Demand for ultra-pure silicon will be strong. According to Dr. Aries, the US consumption was 10,000 lb. in 1956; estimated 20,000 lb. in 1957 and a projected 90,000 lb. in 1960. This is due to the annual doubling of the semi-conductor business, which is expected to continue doubling for 5 to 7 years with a tapered-off growth thereafter.

SLTC Annual Meeting to be Held at Leeds

ANNUAL CONFERENCE of the Society of Leather Trades' Chemists will be held in the large chemistry lecture theatre, The University, Leeds, on 27 and 28 September. This is the 60th anniversary of the founding of the International Association of Leather Trades' Chemists and to mark the occasion the 60th anniversary lecture will be given by K. B. Ross, director of operations, Industrial Group, UK Atomic Energy Authority, who will take as his subject 'Some reflections on the atomic energy industry'.

Programme for the meeting is as follows: *Friday*, 27 *September*, 9.30 a.m. 'Some considerations on the nature of resins tannages' by W. S. Short and G. A. Mittler, The Yorkshire Dyeware and Chemical Co. Ltd. 10.20 a.m. 'Studies on the criteria of tannage' by J. P. Danby, National Leathersellers' College'. 11.30 a.m. 'An approach to the study of vegetable tannins by the oxidation of plant phenolics' by D. E. Hathway, British Leather Manufacturers' Research Association. 2.00 p.m. 60th anniversary lecture. 3.30 p.m. Business meeting of the SLTC.

Saturday, 28 *September*, 9.30 a.m. 'The relationship between grain strength of chrome retan leather and type and quantity of fat liquor' by Dominic Meo, Salem Oil and Grease Co. 10.30 a.m. 'Shell cordovan and analogies with combination tanned sole leather' by W. Frankford and A. Finch, Booth Research Laboratories.

Changes in Australian Import Licensing

TO STREAMLINE their import licensing controls, the Australian Government has brought 56 more commodities under the sales replacement principle. Under this system, importers receive licences on the basis of their selling ability and can obtain supplies from the most competitive source.

Among the 56 commodities are: scientific instruments; synthetic oils; bronzing and metal powders; titanium dioxide; nitrate of soda; rock phosphate manures; dyes; whiting and Paris white; ultramarine blue powder; and acrylic sheet.

Among new items to be licensed on a world basis purchasing list are: chemicals and other raw materials for use in the manufacture of sensitised material and processing chemicals for X-ray and photographic industries; boric acid; bacteriological products; rosin; Orlon and other synthetics; and bentonite.

Items for which import quotas have been increased include: sulphur chloride and carbon tetrachloride; litmus paper and filter paper.

City and Guilds Revised Syllabus

The City and Guilds of London Institute have revised the syllabus for the chemical plant operation scheme. Special chemical technology section D has been divided into two parts, fine chemicals and pharmaceuticals and minor amendments have been made to the petroleum chemicals and chemical fertilisers sections. The first examination on the revised syllabuses will be held in 1958.

PEOPLE in the news

● MR. J. C. HUTTON-WILSON has been elected chairman of the board of British Chrome and Chemicals (Holdings), Ltd., of Eaglescliffe (Co. Durham) following the death of Mr. E. F. Wright. MR. A. D. J. BURNINGHAM, deputy managing director, has been appointed managing director.

● DR. E. J. MILLER, who gave a paper on the practice in Great Britain in regard to pesticide residues in foodstuffs at the conference on control of chemical additives in food, has been chief of the plant pathology laboratory of the Ministry of Agriculture, Food and Fisheries since 1954 and is now concerned with the safe use of pesticides in agriculture. Dr. Miller graduated in biology and chemistry (B.Sc. Hons.) in 1936 at Kings' College, London University. He obtained his Ph.D. in biochemistry in 1939. During the war, he served in the Royal Engineers in the chemical warfare intelligence service, mainly in India, where he first worked with modern pesticides (DDT and BHC).

After the war he joined Government service and took up his present post following a few years with the Ministry's infestation control division.

● DR. W. E. HANFORD, vice-president and director of M. W. Kellogg Co., has been appointed assistant to the president for research at Olin Mathieson Chemical Corporation.

Prior to joining M. W. Kellogg Company, Dr. Hanford was director of research of General Aniline and Film Corporation. He joined General Aniline in 1942, after seven years as research chemist and research group leader with E.I. du Pont de Nemours. Dr. Hanford holds more than 100 patents in the United States and abroad and has made important contributions to the development of nylon, polythene, polyester, elastomers and acetylene chemistry. He also was a leader in the development of the chemistry of fluorocarbons.

● DR. C. N. SMYTH and MR. F. Y. POYNTON, working at the Northampton Polytechnic, London, have received a grant of £2,600 from the Paul Instrument Fund Committee, for continuation of the construction of an ultrasonic microscope for which a grant was made in December 1954. DR. E. T. HALL, senior research officer at the Research Laboratory for Archaeology and the History of Art, Oxford, has received a grant for £2,075 for the construction of an apparatus with which magnetic measurements may be made and for the development of an instrument for applying the method of neutron activation analysis to archaeological problems. Represented on the committee that made the grants are the Royal Society, Physical Society, Institute of Physics and Institution of Electrical Engineers.

● The Texas Company, of New York, US, have appointed MR. L. C. KEMP vice-president in charge of Texaco's petrochemical department. Mr. Kemp, who joined the Texas Company in 1929, was previously general manager of the department.

● MR. P. W. FAULKNER, general manager of the chemical and metallurgical division, Towcester, Northants, of the Plessey Co. has been appointed an executive director.

● MR. W. MORGAN THOMPSON has resigned as sales director of Monsanto Chemicals Ltd., to become chief executive of the Miles Companies. He has been appointed managing director of Miles Laboratories Ltd., 41 Piccadilly, London W1, and chairman of the subsidiary companies, Ames Ltd. and Don S. Momand Ltd. He succeeds MR. DON S. MOMAND who retired last week as managing director but who continues as chairman of Miles Laboratories.

Mr. Morgan Thompson

● DR. A. F. H. WARD, senior lecturer in physical chemistry at the Manchester College of Science and Technology, has been appointed by the Home Office as one of the three scientific advisers on civil defence in the north-west.

● Chief chemist of the Southern Rhodesia Metallurgical Laboratory, MR. BERNARD WITKIN, leaves shortly for the US, under the auspices of the International Co-operative Administration, for a six months' study of the latest process for the extracting of minerals from ores. In a joint statement issued by the office of the American Consul General and the Minister of the Treasury and Mines, MR. C. J. HATTY said that it was recognised that the US had made tremendous strides in this field, and has a vast amount of experience to offer to a country such as Southern Rhodesia. Mr. Witkin graduated in analytical chemistry in 1945 at Cape Town University. In 1952 he was appointed as metallurgical chemist in the Southern Rhodesia Government's Metallurgical Laboratory.

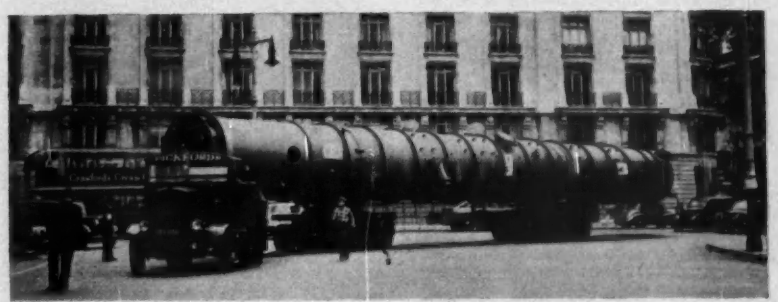
● DR. R. F. CURTIS has been appointed lecturer in chemistry at the University of Swansea for the 1957–58 session.

● CAPTAIN F. G. WAYMAN, referred to on p. 212, chairman and managing director of Rocol Ltd., Swillington, Leeds, and MR. G. J. VINEALL, director of research, have left Britain on the *Queen Elizabeth* on a sales tour of the principal engineering cities of the US.

New Uranium Plant

A new and larger uranium plant is now being built at Springfields, near Preston, alongside the existing factory that has been in production for the Atomic Energy Authority since 1946. The new plant will use more continuous processes to cope with the increasing nuclear power programme and magnesium instead of calcium reduction will be employed in the process.

Ninety-ft. vacuum column en route for Berry Wiggins refinery



Designed by Head Wrightson Processes Ltd. for erection at the Waste refinery of Berry Wiggins, this 26-ton steel vacuum column is shown approaching Marble Arch, London, on its way from the manufacturers, G. A. Harvey. Intended for second stage production of crude oil, this 90-ft. column will manufacture gas oils, lubricating oils and a wide range of bitumens. It has special chrome alloy steel internal cladding for corrosion protection

Commercial News

Price Restraint Brings Extra Business to Johnson Matthey

TRADING conditions for Johnson Matthey and Co. Ltd., were reported for the financial year ended 31 March last by the chairman, Mr. G. C. H. Matthey, as having shown a slight decline in the early part of the year, although there was a marked recovery which had continued up to the present time. The company's policy of price restraint in the face of increased working costs had accounted in part for the reduction in profits, but had, it was stated, played an important part in securing the volume of business which was required. Although Johnson Matthey's objective would continue to be a reasonable rate of profit on maximum sales, their price policy must of necessity be tempered by the rate and extent of further increases in costs.

Reference was made to the formation of a small company in France (reported in CHEMICAL AGE, 1956, 6 Oct., p.18), Johnson, Matthey et Cie, SA, to co-ordinate the ceramic agency and bullion business and to develop the sales of the parent company's other industrial products. In Australia, the company has now acquired 81 per cent of the shares in Garrett, Davidson and Matthey, Pty. Ltd. The chairman reports that it is believed that 'this well-knit company has a bright future before it'. Satisfactory results are also reported for Johnson Matthey's other subsidiary and associated companies abroad, in Canada, the US, S. Africa and Holland.

In this country the whole of the refining and chemical work so far carried out at Hatton Garden, together with the plating plant from Maidenhead and certain units from the Brimsdown works and the Wembley laboratories, are now being moved to Royston. The analytical laboratory is already in operation at the new site. Better use will now be made of the company's premises at Hatton Garden. A sum of £500,000 has been placed to plant reserve for the extensive conversion planned for these premises.

A final dividend of 7 per cent has been declared which with an interim of 3 per cent paid in February this year makes a total distribution of 10 per cent compared with 9 per cent for the previous year.

IBE

Although curtailed production and diminished profits due to disorganisation consequent upon new plant installations were foreshadowed a year ago for IBE (formerly International Bitumen Emulsions) the trading profits for the year ended 31 March last show a substantial fall from £169,000 to £132,000. This reduction, according to IBE chairman, Mr. R. Montgomerie, was more substantial than anticipated.

Various difficulties held to account for this decline in profits were greater competition, increasing costs and lower margins and, in particular, the delay caused by the new installation at Syston was longer than expected and caused a certain disorganisation of output. Full benefits from the considerable outlay expended here cannot be expected in the present financial year, the chairman reports, but expanded sales with a consequent improvement in the profit position are expected.

As liquid resources are likely for some time to be fully employed in the business, a policy of dividend restraint is being maintained. The dividend has, in fact, been cut by 2.5 per cent to 10 per cent.

Commonwealth Industrial Gases

A company in which British Oxygen Ltd. holds a substantial interest, Commonwealth Industrial Gases, is to receive a scrip issue of £A1 million from its nine subsidiaries from capitalisation of reserves. To implement the issue, it is reported that the subsidiaries are increasing their authorised capital by £A4 million to £A14 million. The directors state that the bonus will eliminate the deficiency of consolidation resulting from parent holdings in the subsidiaries.

Consolidated Zinc Acquire Pure Chemicals

It is announced by the chairman of H. J. Enthoven and Sons, lead smelters and refiners, that the directors have accepted an offer from the Consolidated Zinc Corporation to acquire the subsidiary, Pure Chemicals.

It is proposed that Consolidated Zinc shall acquire 75 per cent of the share and loan capital in Pure Chemicals with an option to purchase the remaining 25 per cent within two years.

Mr. A. M. Baer, the chairman, who is also a deputy chairman of Consolidated Zinc, has stated that the trading losses of the subsidiary company, in part due to development expenditure, had been written off the group profit and loss account at 31 December 1956.

The amount realised from the sale of 75 per cent of the company's interest now leaves the book value of the remaining investment in Pure Chemicals at a figure which is below the amount receivable if the option is exercised, he reports.

Solignum Ltd.

Group profits for year ended 31 March for Solignum Ltd., manufacturers of wood preservatives, etc., was £15,499 (£19,168) after tax of £20,608. Dividend of 15 per cent (same) is declared.

NEW COMPANIES

W. A. BALES LTD. Cap. £15,000. Manufacturers of chemicals, gases, drugs, etc. Directors: W. A., E. and A. W. M. Bales. Reg. office: 52 Albany Road, Coventry.

BECKDALE LABORATORIES LTD. Cap. £1,000. Chemical manufacturers, etc. Solicitors: Coward Chance and Co., St. Swithins House, Walbrook, London EC4.

J. A. (BANK STREET) LTD. Cap. £1,000. To carry on the business of rubber reclaimers, and chemical manufacturers and merchants etc. Subscribers: James P. Barker and Jack Eve. Reg. office: 71 Princess Street, Manchester.

CHANGE OF NAME

BEETLE PRODUCTS CO. LTD., chemical manufacturers etc., 1 Argyll Street, London W1. Name changed to BIP Reinforced Products Ltd.

MORTGAGE AND CHARGE

BALDWIN INSTRUMENT CO. LTD., Dartford. 11 June. To Martins Bank Ltd., securing all money due or to become due to the bank. General charge. £40,824.

Market Reports

BUSINESS SLACK OVER HOLIDAY

LONDON Quiet conditions have been ruling in most sections of the industrial chemicals market during the past week and contract deliveries are likely to remain on a small scale for the present. However, there have been a few enquiries for new spot business and the flow of export business has been satisfactory. Prices generally continue firm. The position of the coal tar products is unchanged with activity restricted by seasonal influences.

MANCHESTER Contract deliveries of heavy chemical products during the past week have been seriously affected by holiday stoppages at the consuming end, but apart from this seasonal factor the course of trade in chemicals in the Lancashire area may be regarded as satisfactory. With an odd exception, prices maintain a strong undertone., In sympathy with the metal sulphate of copper has been further reduced by 50s a ton to £80 5s. A fair trade in fertiliser materials has been reported.

GLASGOW Conditions in the Scottish heavy chemical market showed some improvement during the past week, and in particular towards the latter end, due to the resumption after the holiday period. Demands have been for normal requirements, covering the usual range of chemicals. Export still continues satisfactory with a good volume of enquiries being received. On the whole, prices have been steady, but they still show some increases taking place.

TRADE NOTES

Nitrile Gum Thermoplastic

The nitrile gum thermoplastic, Royalite, developed by the United States Rubber Co., is now being made in Edinburgh by the North British Rubber Co. Ltd. This material, made from a plastic copolymer and synthetic rubber, permits the alloying of plastics.

Already established in the US, Royalite is said to be grease and oil resistant, stain resistant, waterproof, mildew proof, vermin-proof, odourless, warm to the touch even at low temperatures, washable, and resistant to most alkalis and acids. Although not resistant to aromatic solvents, in general it is said to be resistant to most organic materials.

Two basic types of Royalite gum plastic composition are available—rigid and flexible. These are formulated to manufacture products that give useful service life from 20° to approximately 240°F. Several improvement patents have been granted or applied for.

New M & B Laboratory Chemicals

A new range of 10 special laboratory chemicals has been introduced by May and Baker Ltd., Dagenham, Essex. The compounds offered in this range are organic intermediates that are not readily available in commerce, at least not in what is termed the requisite quantity. Most of the compounds have been chosen for their chemical versatility; others are useful in special fields of research. All have been used by the company's own research organisation and are said to have proved valuable and reliable.

The range will be expanded from time to time. The first list comprises the following compounds:

4:4'Diaminostilbene-2:2' disulphonic acid (amsonic acid)
2:2'-Dihydroxy-1:1'-dinaphthylmethane-3:3-dicarboxylic acid (embonic acid)
2-Acetamido-4-nitrobenzoic acid
4-Amino-β-phenylethylamine
8-Amino-6-methoxyquinoline
4-Aminobenzonitrile
4-Acetamido-3-nitroanisole
4-Acetamidobenzaldehyde
4-Cyanobenzaldehyde
4:7-Dichloroquinoline

Truck Industry Combination

Clark Equipment International CA has become an equal partner with the Austin Motor Company Ltd., and Crompton Parkinson Ltd. They now share equally in ITD Ltd., an established business organisation which has been marketing the Stacatruc fork lift truck and Electricar platform truck. Under this agreement ITD Ltd. will have available Clark patents, designs and technical experience of light and heavy duty fork lift truck equipment and straddle carriers.

The reconstituted ITD Ltd. will take over from Austin Crompton Parkinson Electric Vehicles Ltd. the manufacturing resources at the Hall Green factory, which is being extended, and become responsible for the manufacture, sales and servicing of industrial platform and fork lift trucks.

Contract for Coppee

The Coppee Company (Great Britain) Ltd. have obtained a contract for approximately £1¼ million for coke ovens, chemical by-product plant, and coal preparation plant for the Rhodesian Iron and Steel Company Limited's steel works extensions at Que Que, Southern Rhodesia.

This contract has been obtained through the operation of the associated company, Powell Duffryn-Coppee Ltd., 8 Great Tower Street, London EC3.

Isophthalic Acid in Britain

The Oronite Chemical Company (San Francisco) have appointed Grange Chemicals Ltd. (Devonshire House, Mayfair Place, London W1) their UK distributors of isophthalic acid in commercial quantities. Principal uses of the new phthalic acid are in alkyd resins, polyester resins and plasticisers.

Steel Annealed at 600 ft. a Minute

A new plant for continuous cleaning and annealing of steel has been installed at the Velindre, South Wales, works of the Steel Co. of Wales Ltd. This plant, the first in Europe, anneals steel strip, of the width required for tinplate, at 600 ft. a minute.

Previously in this country annealing has been carried out in batch-type furnaces.

Agents for German Firm

Light and Co. Ltd., Colnbrook, nr. Slough, have been appointed sole agents for Hans Heinrich Hutte, of Frankfurt-on-Main, for the sale of caesium and rubidium compounds, including caesium bromide for optical crystals. Light and Co. are suppliers of lithium aluminium hydride, lithium hydride, lithium borohydride and sodium borohydride.

Price Reduction

Whiffen and Sons Ltd., Fison House, 95 Wigmore Street, London W1, announce reductions in the price of Ralsin (nylon 11) moulding powder. Ralsin is manufactured in France under the name of Rilsan by Societé Organico of Paris. It was exhibited for the first time in Britain at the recent Plastics Exhibition.

Chilean Nitrate of Soda

Until further notice, the price for refined granulated Chilean nitrate of soda, over 98 per cent, in 6 ton lots or more, delivered carriage paid to any British station, is £29 10s net per ton of 2,240 lb. gross weight. There is an allowance of 15s per ton on any quantities collected from the nitrate depots of the Nitrate Corporation of Chile Ltd., 20–24 Ropemaker Street, London EC2.

Obituary

MR. FREDERICK EDWARD F. BLYTHE, chairman of William Blythe and Co., and John Riley and Sons, and a director of Sizing Materials Company, has died.

British Oxygen's Anti-Corrosion Flame-Cleaning Process

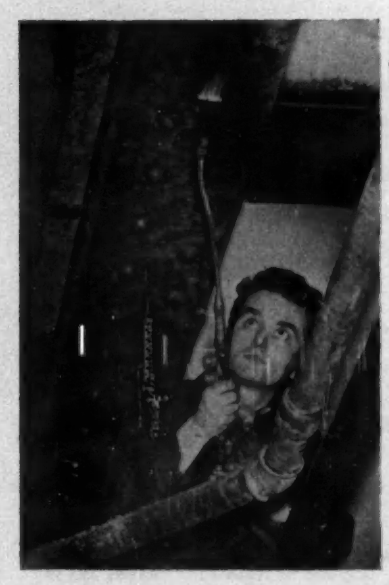
APPLICATIONS of a flame-cleaning process, briefly mentioned in our issue of 20 April 1957, page 674, have been detailed in a booklet issued by the British Oxygen Co., Bridgewater House, Cleveland Row, London SW1.

Flame cleaning is carried out by passing a high temperature flame over the surface of the metal to be painted in a series of ½-in. forward and ¼-in. backward movements. Oxy-acetylene has been found to be the most efficient gas flame; it rapidly heats the surface with the minimum of heat spread through the plate or structure. The blowpipe from the cylinders can be fitted with different nozzles, flat nozzles which give a brush-like flame pattern for flat surfaces and large areas, and round nozzles for small sections and awkward corners.

If the flame cleaning is immediately followed by painting an intimate bond between the metal and the primer coat is made, because the heat of the cleaned metal tends to lower the natural viscosity of the priming paint and enables it to penetrate more easily into minute surface irregularities. For the best results the primer should be applied when the steel is approximately 100°F. and subsequent coats should be applied as rapidly as drying permits.

It is recommended that face masks be used as a protection against dust and fumes on most occasions when the cleaning process takes place indoors, or in a confined space out of doors.

Among the applications of the flame-cleaning process have been the removal of rust and old paint from gas holders, bridge structures, park railings, electric pylons, scale from ships and encrusted cement from cement mixers.



British Oxygen flame cleaning in use

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents),' which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s 3d including postage; annual subscription £8.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection on 4 September

Extractive distillation operation for preparation of catalytic cracking feed stocks. Esso Research & Engineering Co. **782 791**

Anti-corrosion compositions. Esso Standard Soc. Anon. Francaise. **782 879**

Measuring apparatus for fluids. Aktiebolaget Ljungmans Verkstäder. **782 728**

Chemically resistant glass. Zeiss-Stiftung, C., [trading as Jenaer Glaswerk Schott & Gen.] **782 620**

Apparatus for extracting gases from molten metal. Bochumer Verein Für Guss-Stahlfabrikation AG., formerly Gusstahlwerk Bochumer Verein AG. **782 558**

Preparation of crystalline solid materials. Diamond Alkalj Co. **782 635**

Organosilicon compositions. Midland Silicones Ltd. **782 797**

Organosilicon compounds and a process for treating glass fibres therewith. Midland Silicones Ltd. **782 884**

Manufacture of fibres, particularly glass fibres. Soc. Anon. Des Manufactures Des Glaces Et Produits Chimiques De St.-Gobain, Chauny, & Cirey. **782 802**

Preparation of purified intrinsic factor preparations. Organon Laboratories, Ltd. **782 808**

Purified papains or papain-like ferments. Schering AG. **782 809**

Organic compounds containing nitrogen, arsenic, sulphur or selenium. Opfermann, A. C. J. [Divided out of 771 116.] **782 888**

Therapeutically active amines and salts thereof. Hoffmann-La Roche & Co., AG., F. [Divided out of 782 820.] **782 821**

Open to public inspection on 25 September

Recovery of plutonium from solutions containing it. Maddock, A. G., and Booth, A. H. **783 601**

Phospho-nitrogenous fertilisers. Soc. Anon. Des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny, & Cirey. **783 507**

Recovery of uranium by ion-exchange. Permutit Co., Ltd. **783 591** **783 592**

Organic phosphorus compounds. Food Machinery & Chemical Corporation. **783 697**

Polymerisable amido compounds. Ciba Ltd. **783 604**

Soluble aluminium glycolates and derivatives. Farbwerke Hoechst AG. Vorm. Meister, Lucius, & Brüning. **783 605**

Process for alpha-ethynyl-carbinols. Rheinpruessen AG. Für Bergbau Und Chemie. **783 417**

Manufacture of salts of sulphuric acid esters of leuco vat dyestuffs of the anthraquinone series. Durand & Huguenin AG. **783 701**

Catalysts. Laporte Chemicals, Ltd. **783 590**

Digestion of fibres of raw material for the production of pulp or cellulose. Bhargava, M. P. **783 608**

N-thiotrichloromethyl sultams. Ruhrchemie AG. **783 425**

Dyeing nitrogenous fibrous material. Ciba Ltd. **783 610**

Magnetic systems. June 11, 1954. Mullard Radio Valve Co., Ltd. **783 494**

Gibberellic acid and derivatives. Imperial Chemical Industries, Ltd., Brian, P. W., Radley, M. E., Curtis, P. J., and Elson, G. W. [Cognate application 34129.] **783 611**

Treatment of clays. UK Atomic Energy Authority. **783 529**

N-aminoalkyl-sulphonic acids. Ruhrchemie AG. **783 704**

Separation of metallic halides. British Titan Products Co., Ltd. **783 534**

Phenol-aldehyde resinification. Allied Chemical & Dye Corporation. **783 537**

Diisocyanate-modified polyesters and rubber-like materials derived therefrom. Imperial Chemical Industries, Ltd. [Cognate application 6897.] **783 615**

Production of hollow laminated tubes. Distillers Co., Ltd. **783 538**

Pyrazole compounds. May & Baker, Ltd. **783 706**

Curing of ethoxyline resins. General Electric Co. **783 621**

Hydrogen peroxide. Laporte Chemicals, Ltd. **783 709**

Trinuclear polymethine dyes containing a pyrryl, indolyl or pyrrocolyl nucleus and photographic emulsions containing dyes so made. Kodak, Ltd. **783 595**

Alkaline earth metal silicates. Farbenfabriken Bayer AG. **783 712**

Bis-mercaptomethyl aromatic compounds. Esso Research & Engineering Co. **783 546**

Dyeing or printing fibres of polyacrylonitriles. Ciba Ltd. **783 443**

Isolation of difficultly volatile dialkyl esters of dicarboxlic acids from solutions by evaporating the solvent. Newby, H. (Chemische Werke Hüls AG). **783 625**

Sonic gas analysers. Parsons & Co., Ltd., C. A. **783 748**

Gas chromatography. Parsons & Co., Ltd., C. A. **783 713**

Fluxing agent for the hard-soldering of aluminium and aluminium alloys. Thiemann, W. H. A. (Henninger, A. B.). **783 446**

Sensitised photographic emulsions. Kodak Ltd. **783 596**

Chemical compounds containing the pyrrocoline nucleus. Wellcome Foundation Ltd. **783 627**

Recovery of thorium from monazite. UK Atomic Energy Authority. **783 628**

Cooling and de-gassing of liquids. Celanese Corporation of America. **783 503**

Continuous reactors suitable for use in the ageing of alkali cellulose. Celanese Corporation of America. **783 504**

Ageing of alkali cellulose. Celanese Corporation of America. **783 505** **783 506**

Pigment compositions. Badische Anilin- & Soda-Fabrik AG. **783 715**

Extrusion of organic thermoplastic materials. Imperial Chemical Industries Ltd. **783 449**

Synthetic resin ion-exchanging membranes. Farbenfabriken Bayer AG. **783 450**

Plastic coated articles. Hercules Powder Co. **783 552**

Treatment of cereal grains. Takeda Pharmaceutical Industries Ltd. **783 632**

Solvent-stale alpha- and gamma-forms of metal-free phthalocyanine. Badische Anilin- & Soda-Fabrik AG. **783 634**

Laminated structures. Du Pont De Nemours & Co., E. I. **783 555**

Extracting sodium vanillinate. Monsanto Chemical Co. **783 454**

Device for heating fine granular material. Klöckner-Humboldt-Deutz AG. [Addition to 710 236.] **783 556**

Removal of combustible waste deposits from the internal surface of a metal tube, conduit or the like. British Oxygen Co. Ltd. **783 559**

Pelleted carbonaceous material. Union Carbide Corporation. **783 720**

Composite films. Imperial Chemical Industries Ltd. **783 457**

Aldehyde condensation reactions. Celanese Corporation of America. **783 458**

Glycol sulphite. Newby, H. (Chemische Werke Hüls AG.). **783 561**

Esters purification process. Distillers Co. Ltd. **783 463**

Countercurrent contact apparatus. Kittel, W. **783 466**

Cross-linked diisocyanate-modified polyesters of high molecular weight. Farbenfabriken Bayer AG. [Addition to 777 145.] **783 564**

Extraction-extrusion process and apparatus for plastic material. Du Pont De Nemours & Co., E. I. **783 723**

Aromatics and unsaturated hydrocarbons. Esso Research & Engineering Co. **783 567**

Stabilised acrylonitrile polymers. Monsanto Chemical Co. **783 724**

Preparation of higher alkenes by thermal cracking of heavy hydrocarbon oils and certain derivatives. Naamloze Vennootschap De Bataafsche Petroleum Maatschappij. **783 469**

Granular solids withdrawal method and apparatus. Socony Mobil Oil Co. Inc. **783 644**

Controlled withdrawal of granular solids from a liquid granular solids contacting zone. Socony Mobil Oil Co. Inc. **783 569**

Organic nitrogenous compounds. Badische Anilin- & Soda-Fabrik AG. **783 728**

Zirconium ternary alloys. UK Atomic Energy Authority. **783 646**

Acceleration of polymerisation. Rohm & Haas Co. **783 731**

Separation of polycarboxylic acids from mixtures containing them. Henkel & Cie. Ges. **783 369**

Preparation of calcium carbide. Stamicarbon NV. **783 370**

Dry spinning cellulose ester solutions. Celanese Corporation of America. **783 473**

Non-return valves for liquid pumps. Koninklijke Machinefabriek Geb. Stork & Co. NV. **783 374**

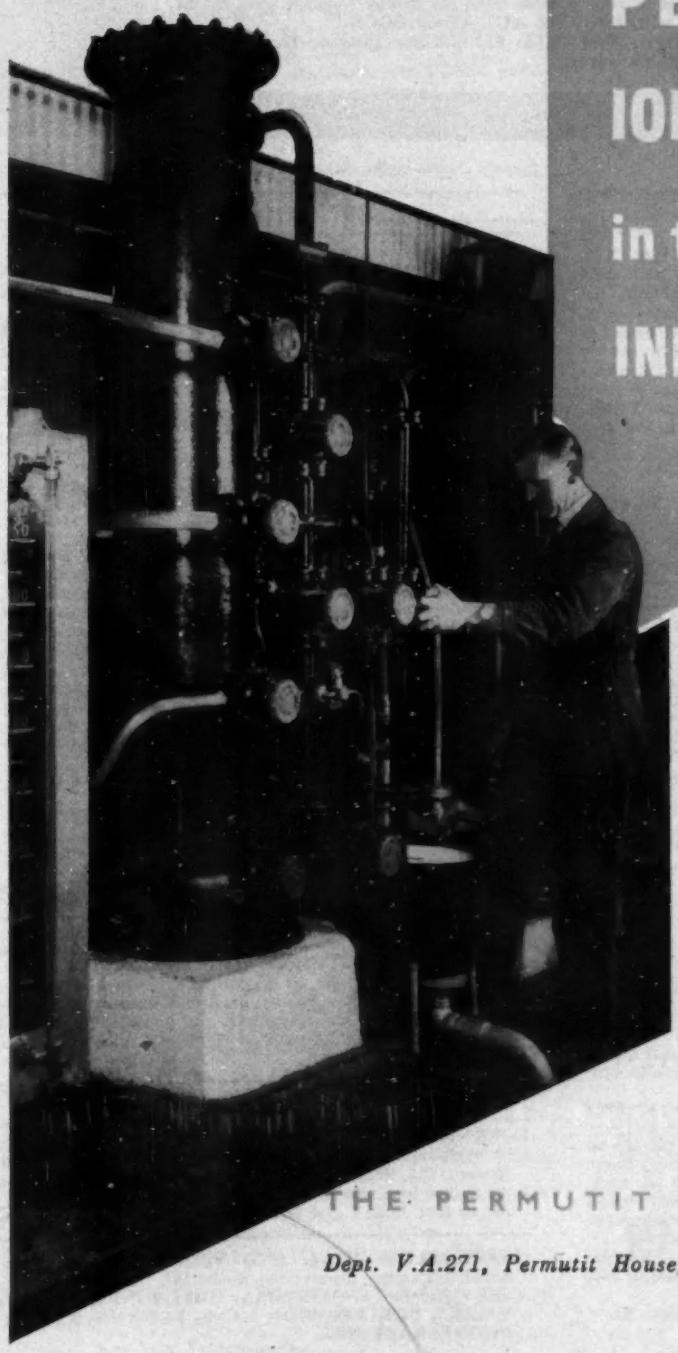
Fire-extinguishing substances. Nu-Swift Ltd. **783 656**

Soap compositions. Unilever Ltd. **783 658**

Rust preventive aviation oil. Esso Research & Engineering Co. **783 578**

Titanium dichloride and zirconium dichloride. Farbenfabriken Bayer AG. **783 737**

PERMUTIT ION EXCHANGE in the CHEMICAL INDUSTRY



Yet another application of Permutit Ion Exchange is the deacidification of formaldehyde, which is performed by the Permutit plant illustrated here. Increasing numbers of Permutit Ion Exchange plants are now being used to improve and accelerate many chemical and metallurgical operations. Perhaps in *your* industry Permutit can help to improve the product or reduce costs. For full technical information and advice, please write to :—

THE PERMUTIT COMPANY LIMITED

Dept. V.A.271, Permutit House, Gunnersbury Avenue, London, W.4
Telephone: CHIswick 6431

Classified Advertisements

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to mid-day Tuesday for insertion same week.
SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.
SUBSCRIPTION: Annual Subscription of 52/6 brings 52 weekly copies of CHEMICAL AGE direct to your address from the printer (postage paid by the publishers), and a copy of CHEMICAL AGE YEAR BOOK.
COMPANY MEETINGS AND REPORTS: £12.12.0 per column. Three column measure (approximately 360 words).

EDUCATIONAL

A.M.I.CHEM.E.—More than one-third of the successful candidates since 1944 have been trained by T.I.G.B. All seeking quick promotion in the Chemical and Allied Industries should send for the T.I.G.B. Prospectus. 100 pages of expert advice, details of Guaranteed Home Study Courses for A.M.I.Chem.E., B.Sc.Eng., A.M.I.Mech.E., A.M.I.Prod.E., C. & G., etc., and a wide range of Diploma Courses in most branches of Engineering. Send for your copy today—**FREE.** T.I.G.B. (Dept. 84), 29 Wright's Lane, London, W.8.

UNIVERSITY OF MANCHESTER
THE NEXT SESSION COMMENCES
on
THURSDAY, 3rd OCTOBER, 1957

OFFICIAL APPOINTMENTS

EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS in various Government Departments. The Civil Service Commissioners invite applications for pensionable posts.

The posts are divided between following main groups and subjects (a) Mathematical and Physical Sciences, (b) Chemistry and Metallurgy, (c) Biological Sciences, (d) Engineering subjects and (e) Miscellaneous (including e.g. Geology, Library and Technical Information Services).

Age Limits: For Experimental Officers, at least 26 and under 31 on 31st December, 1957; for Assistant Experimental Officers at least 18 and under 28 on 31st December, 1957. Extension for regular service in H.M. Forces. Candidates aged 31 or over with specialised experience for Experimental Officer posts may be admitted.

Candidates must have at least one of a number of specified qualifications. Examples are Higher School Certificate, General Certificate of Education, Scottish Leaving Certificate, Scottish Universities Preliminary Examination, Northern Ireland Senior Certificate (all in appropriate subjects and at appropriate levels), Higher National Certificate, University degree. Candidates taking their examinations in 1957 may be admitted provisionally. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. In general a higher standard of qualification will be looked for in the older candidates than in the younger ones.

Salary (London): Experimental Officer. Minimum £925 (women £853): Men's scale, maximum £1,135.

Assistant Experimental Officer. Starting pay £365 (at 18) up to £655 (women £632) at 26. Men's scale, maximum £805. These salary scales are being increased by approximately 5 per cent. Women's scales are being raised to reach equality with men's by 1961. Somewhat lower outside London. Promotion prospects. Opportunities for further education.

Further particulars, from Civil Service Commission, Scientific Branch, 30 Old Burlington Street, London, W.1, quoting No. S94-95/57.

Interview Boards arranged at intervals, as required. Early application is advised.

SITUATIONS VACANT

SHIFT SUPERVISORS required for important Pilot Plant work. Some knowledge of organic chemical manufacture would be of advantage. Salary will depend on age and experience. Pension Fund. Apply Works Manager, **LAPORTE CHEMICALS LIMITED,** Luton.

CHEMICAL ENGINEER
required for
Thornton Research Centre
near Chester

in Experimental Plants Section. The work is associated with the development of new chemical materials for exploitation in the oil industry, and will include cost calculations, design work, laboratory investigation, and the operation of small-scale plant. Minimum qualifications are an Honours Degree in Chemical Engineering and/or Graduate Membership of the Institution of Chemical Engineers. Some previous experience in process or product development or pilot plant operation would be an advantage. Five-day week and attractive pension scheme. Applications should be addressed to

"SHELL" RESEARCH LIMITED,
Staff Dept. (C/E), 16, Finsbury Circus, London, E.C.2.

SITUATIONS WANTED

CHIEF CHEMIST-TECHNICAL MANAGER, youthful 43. B.Sc., F.R.I.C., used to Contacts, Liaison, Development; experience ranging Vitamins, Plastics, Closures; seeks change from comfortable office, secretary and no work, to responsible job with prospects, London or Home Counties. **BOX 3562.**

FOR SALE

1—ERNEST NEWALL CALCINER, 5 ft. j/d by 75 ft. long. Shell Plate 9/16 in. M.S. Plate with 2 Supporting Tyres, Rollers, C.I. Bedplates, Driving Gears and Reduction Gears. Available for inspection Tees-side Area. Interested parties reply to Box 3560.

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3 (TELEPHONE: EAST 3295).**

BOX NUMBERS: *Reply c/o "Chemical Age" · Bouverie House · Fleet Street EC4.*

FOR SALE: continued

BEST QUALITY Cotton Duck Filter Press Cloths. All Brand New, Stitched and Eyeletted.
600 off 30" x 31" x 2½" Centre Hole for 27" Plate
1600 „ 30" x 31" x 2" Centre Hole for 27" Plate
1000 „ 33½" x 33½" x 2½"Centre Hole for 30" Plate
1500 „ 33½" x 33½" x 2" Centre Hole for 30" Plate
New Molasses Press Cloths
1800 off 38" x 39½" x 2½" Centre Hole. Box 3561.

BAKER-PERKINS No. 17 DOUBLE "Z" MIXER, 150 gallons.
STAINLESS LINED DOUBLE "Z" MIXER, 100 gallons.
STAINLESS STEEL DOUBLE "Z" MIXER, 20 gallons.
STAINLESS STEEL "U" MIXER, 10 cu. ft.
STAINLESS-LINED COIL VAT by Cherry-Burrell. 200 galls. with Revolving Tinned Coil.
ALITE SIFTER-MIXER, 400 lb.
REVOLVING DRUM MIXER, 6 ft. by 2 ft. 4 in.
PEERLESS 4-SPEED MIXER, 80 qrt.
WINKWORTH MACHINERY LTD., 65 High Street, Staines. Telephone: 1010.

MORTON, SON AND WARD LIMITED
offer
NEW UNITS in stainless or mild steel made to requirements:
CONDENSERS,
MIXING VESSELS,
JACKETED PANS with or without Mixing gear,
'MORWARD' 'U' shaped trough **MIXERS** with or without jackets,
TANKS: CYLINDERS: RECEIVERS: PRESSURE VESSELS and **AUTOCLAVES.**
NEW (ex stock):
JACKETED PANS:
100g, 150g and 200g in mild steel, suitable for 100 lb in jacket. With or without mixing gear.
SECOND HAND (ex stock):
600g totally enclosed **JACKETED VESSEL,** 80 lb p.s.i. in jacket, 50 lb internal.
600g open top **JACKETED VESSEL,** 80 lb in jacket.
350g (2 available) totally enclosed **JACKETED PANS** 80 lb in jacket, 50 lb internal.
400g open top **JACKETED PAN,** open top, 80 lb in jacket.
300/400g **PRESSURE VESSELS** with detachable tops, standing on 4 feet, 80 lb p.s.i. internal pressure.
STIRRING GEAR can be fitted to any of the above vessels.
Enquiries invited:
MORTON, SON AND WARD LIMITED,
WALK MILL,
DOBCROSS, NEAR OLDHAM,
Lancs.
'Phone Saddleworth 437

Brand New **COCHRAN** Vertical and **ECONOMIC** Self-contained **STEAM BOILERS** in stock, also all sizes reconditioned and guaranteed. List on request.
STAINLESS STEEL TANKS, PANS, CONDENSERS, PLATES, VALVES AND COCKS. Very wide selection.
400 gall. S.S. Autoclave, copper jacketed.
FRED WATKINS (BOILERS) LTD.,
COLEFORD, GLOS.
Phone: Coleford 2271/2

PHONE 98 STAINES
(2) "Melvin" (all Gunmetal) Jac. Fin Blade Enc. Mixers 30 in. x 27 in. x 24 in.
(Unused) 75 gallon S.S. Jac. Pans 30 in. x 36 in. 40 w.p. (3)
(Unused) 50 gallon S.S. Gas fired Jac. Pan.
"Manesty" Elec. Pelleting Machine.
(2) Steel Condensers 11 ft. x 1 ft. 2 in. diam. with 120-1 in. steel tubes.
(2) "Cannon" Enamel lined Cast Iron Jac. Pans 3 ft. x 3 ft. 6 in. deep.
'Z', Cyl. and 'U' trough Mixers, Pumps, Autoclaves, Stills, Hydros, Crushers, Disintegrators, etc.
Lists available of s/h plant in stock.
HARRY H. GARDAM & CO. LTD.

FOR SALE: continued

3—TYPE F.35 2 STAGE ATOMIZERS of special design provided with all necessary safety devices for fast running machinery. Designed to resist great centrifugal force and dynamically balanced. Provided with forced lubrication. The Atomizers have special devices for distributing liquid to the Atomizer wheel and the distributor is designed for cooling by means of air. The machines are in good condition and are as originally supplied by A/K Niro Atomizers. Available for inspection Tees-side area. Interested parties reply to Box 3563.

1. NO. 2 DEVIL DISINTEGRATOR, by Hardy Patent Pick Co., grinding chamber 30 in. diam., 29 in. Brass Rings, feed Hopper 13 in. by 7 in., ring oil bearings, pulley 14 in. diam. by 7 in. face. Good condition. **THOMPSON & SON (MILLWALL) LIMITED, MILLWALL, E.14. TEL. EAST 1844.**

STAINLESS STEEL

45 plates.	4' 6" × 2' 6" × ¼" thick.	Spec. S.62 (En.56C)	H/Rolled.
100 sheets.	8' 2" × 4' 2" × 16 SWG.	„ S.80 (En.57)	B.P.1.S.
75 sheets.	8' 2" × 4' 2" × 16 SWG.	„ S.80 (En.57)	D.P.1.S.
91 sheets.	8' 2" × 4' 2" × 16 SWG.	„ S.80 (En.57)	D.P.2.S.
61 sheets.	6' × 2' × 16 SWG.	„ S.80 (En.57)	Descaled.
85 sheets.	6' × 2' × 16 SWG.	„ S.80 (En.57)	Black.

Various other items of Stainless Steel available.
ALL THE ABOVE MATERIAL AVAILABLE EX STOCK
WRITE BOX 3559

GRAPHITE—GRAPHITE 99%C. Dohm Ltd., 167 Victoria Street, S.W.1.

HARRISON CARTER. 5 ft. Edge Runner Mill with granite bed and rolls 2 ft. 6 in. diameter by 8½ in. fall. With reduction drive gear and 6 h.p. motor for 400/3/50. Excellent condition. **F. J. EDWARDS LIMITED, 359 EUSTON ROAD, LONDON, N.W.1.**

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade
THE CRACK PULVERISING MILLS LTD.
Plantation House,
Mincing Lane,
London, E.C.2

GRINDING, CRUSHING AND GRADING
FINE GRINDING LTD.,
BLACKHOLE MINE, EYAM
TELEPHONE: EYAM 227

PULVERISING of every description of chemical and other materials. Collections, storage, deliveries. **THOMAS HILL-JONES, LIMITED, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3. (TELEPHONE: EAST 3285.)**

PATENTS & TRADE MARKS

KINGS PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a Queen Victoria Street, London, E.C.4. City 6161. Booklet on request.

HEATING TAPES ★
For many applications
May we help you with your problem?
THE STABILAG CO. LTD.
MARK ROAD · HEMEL HEMPSTEAD

FILTER CRUCIBLES of Porous Porcelain

retain the finest precipitates and filter rapidly. They are not affected by acids, remain constant in weight within very fine limits and can be heated to high temperatures.

Made by

The **WORCESTER ROYAL PORCELAIN CO.**
LIMITED

Supplied by all recognised Laboratory Furnishers.

Rockets and Guided Missiles

By
JOHN HUMPHRIES

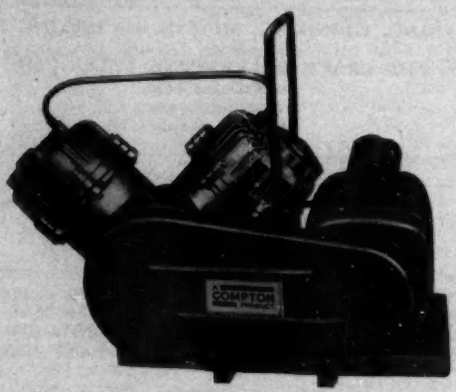
INTENDED in the main for engineers and technicians, this complete survey of present-day achievements and possible future developments presents the latest information on rocket motors and their applications from an engineer's point of view. Both solid and liquid propellant motors are discussed, the latter more fully as being of greater interest to the engineer. The first half of the book covers propellants, motors and components, the second, the applications of these motors to missiles and aircraft, and in conclusion a review of potentialities for the future is appended. The author has had wide practical experience following a brilliant scholastic career, and is at present actively engaged on rocket research.

31*s.* (*postage paid*)

Ernest Benn Limited

Bouverie House · Fleet Street · London · EC4

COMPTON



Type 2D and 2D-625 Series 2

OIL-FREE AIR COMPRESSORS

This machine has an absolutely oil-free output and is therefore suitable for many industrial purposes where contamination by lubricating oil cannot be tolerated.

DAWSON McDONALD & DAWSON LTD.
COMPTON WORKS · ASHBOURNE — Phone 113 — DERBYSHIRE

Thermometers . . .

HIGH-PRECISION INSTRUMENTS FOR SCIENTIFIC RESEARCH—ANSCHUTZ, CALORIMETER AND SECONDARY STANDARDS.

ZECOL ZECOL

EST. 1898

Hydrometers...

PLAIN AND COMBINED FORMS. PRECISION TYPES FOR SPECIFIC GRAVITY, DENSITY AND ALL ARBITRARY SCALES. MADE TO I.P., B.S., S.T.P.T.C. AND A.S.T.M. SPECIFICATIONS.

A.S.T.M. 45F Kin, Vis, Thermometer

Instruments N.P.L. Certified if required

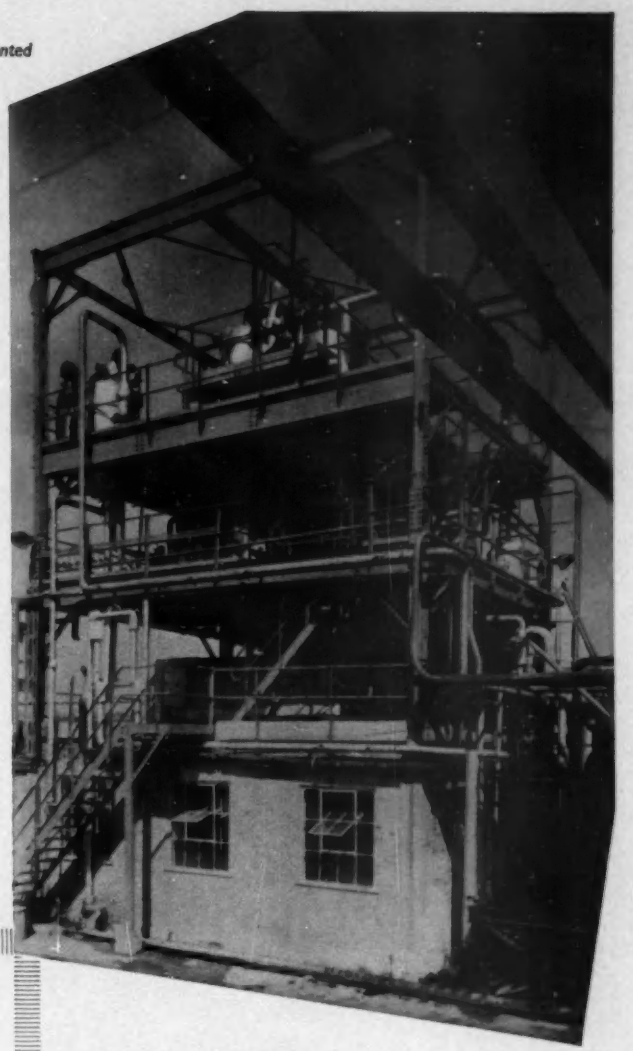
G. H. ZEAL LTD.

Lombard Road, Morden Road, London, S.W.19

'PHONE: LIBERTY 2283/4/5/6

'GRAMS: ZEALDOM, SOUPHONE, LONDON

The Continuous Nitrile Plant—The heart of the patented Armour process for producing cationic chemicals.



are you an up-to-date executive?

You will want to keep abreast of industrial progress to improve your present process, or add new lines. In either case, contact us *now*!

Armour Chemical Division are the world's biggest producers of cationic chemicals, offering a comprehensive technical service for the use of their

ARMEENS (*Aliphatic amines*)

DUOMEENS (*Diamines*)

ARQUADS (*Water and oil soluble quaternaries*)

ETHOMEENS (*Ethylene oxide compounds of amines*)

ARMACS (*Amine acetates*)

and other chemicals

There is an Armour Product for nearly every industry, including:

AGRICULTURE, FERTILIZERS, ANTI-BIOTICS, PAINT AND PIGMENTS, ROAD CONSTRUCTION, SYNTHETIC RESINS, NATURAL AND MAN-MADE FIBRES, LAUNDRY, MINERAL FLOTATION, RUBBER, CRUDE OIL PRODUCTION, PETROLEUM PRODUCTS, DETERGENTS, METAL WORKING, WATER TREATMENT—

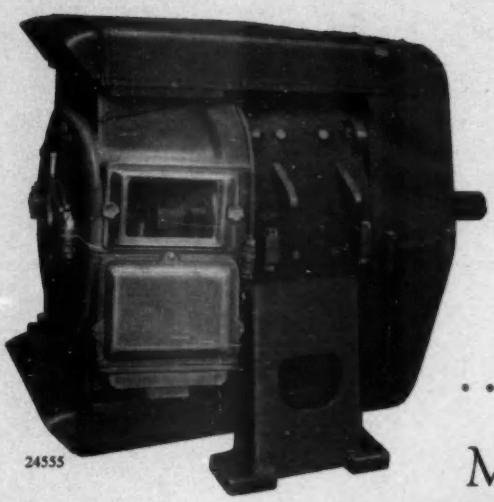
to mention only a few

ARMOUR & COMPANY LTD. CHEMICAL DIVISION

LINDSEY STREET, LONDON, E.C.1. CLERKENWELL 9011. INTERNATIONAL TELEX 23567

Branches or Agents throughout the world

No admittance...



... to dirt and dust,
acid splashes,
corrosive fumes in
gas works, boiler houses
and coke oven plants

... When you employ

Metrovick TECAC Motors

The illustration shows a Metrovick TECAC direct-current motor with integral fan-operated air cooling circuits.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER 17

An A.E.I. Company

ACID & ALKALI
RESISTING LININGS
IN
BRICK, TILE, P.V.C.
&
RUBBER
FOR ALL TRADES

RIZISTAL
TRADE MARK

COMPLETE PLANTS
FOR PICKLING
FUME EXTRACTION
&
EFFLUENT
TREATMENT

PICKLING TANKS 90 FEET LONG WORKING SUCCESSFULLY

RIZISTAL

ALL BRITISH GUARANTEED PRODUCTS

MANUFACTURERS
OF
SILICA, LATEX,
CASHEW, FURANE, &
POLYESTER RESIN CEMENTS

SKYMMIT & BRUSH-ON
IMPERVIOUS COATINGS

P.V.C. & STAINLESS STEEL
FABRICATIONS FOR ALL PURPOSES

JOHN L. LORD & SON
WELLINGTON CEMENT WORKS
TELEGRAMS: "CEMENT"
PHONE: BURY 617
BURY, LANCASHIRE

Printed in England by Staples Printers Limited at their Bayswater, London, establishment, and published by Benn Brothers Ltd., at Bouverie House, 154 Fleet Street, E.C.4. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.